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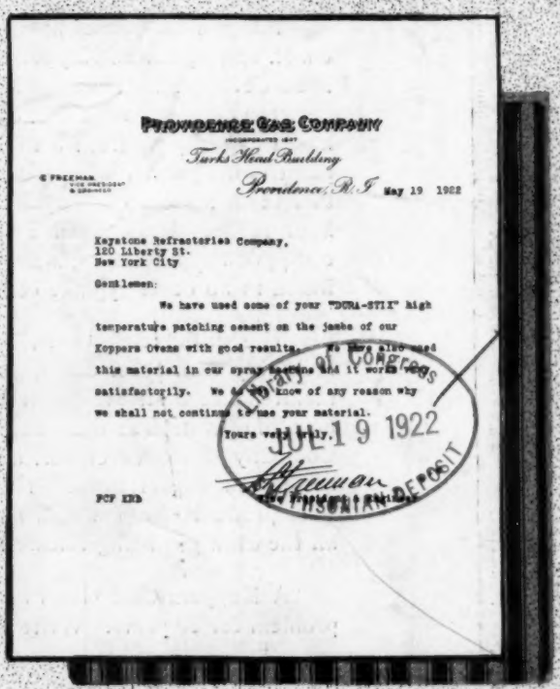
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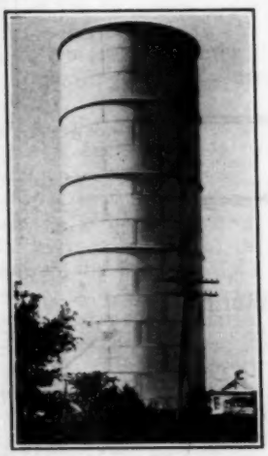

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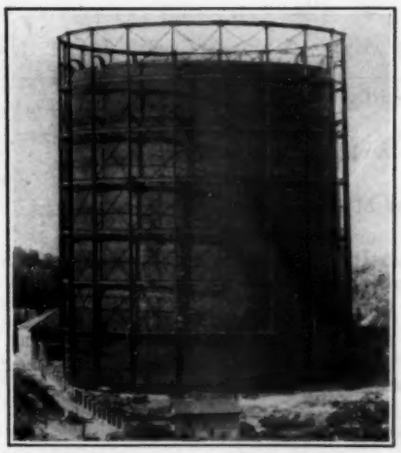

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SIXTY-THIRD YEAR

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New Coke Ovens Use Highly Volatile Coals

Results of One Year's Operation Disprove Many Old Theories

By H. J. GIFFORD

The first of many important conclusions and deductions resulting from the experiences of the first year's venture in the operation of the new coking plants of the St. Louis Coke & Chemical Company, at Granite City, Ill., where the Roberts patent ovens for the first time in the history of the gas, coal and iron industries are producing metallurgical coke from the highly volatile Illinois and Indiana coal, serve excellently to disprove some old theories and to prove many new facts relative to the manufacture of by-product coke.

Because of the vast coal fields in Illinois and part of Indiana, it had long been a deplored fact that, due to the high volatility of this grade of coal, the production of by-product coke therefrom has been impossible. But the invention of the Roberts oven, of baffle wall structure, marks an epoch in the development of the gas industry as well as in its allied interests. Now, after more than a year's practical operation, the results of this experimental period are at hand.

On Jan. 1, 1921, the $5,000,000 plant was completed and operations were begun. The immensity of the program, successfully carried out during this period, is shown by the actual figures of production. The various divisions of the works have a daily output of 10,000,000 cu. ft. of gas, 20,000 lb. of coal tar, 60,000 lb. of ammonia sulphate, 1,500 tons of coke, and 450 tons of pig iron. The daily water consumption is 5,000,000 gal., and the plant requires a complete rail system, using three locomotives night and day. These are the figures based on operations at present. When the original project is ultimately carried out these figures will be trebled.

There are eighty of these Roberts ovens at the St. Louis company's plant, operated in two batteries of forty each, and one blast furnace of 500 tons capacity. The blast furnace is eighty-six feet in height, has a seventeen-foot hearth, with a bosh twenty feet six inches and a bosh angle of 80 deg. 5 min. Coke oven gas and tar are used to heat the furnaces, which supply molten metal to the ten open-hearth furnaces of the National Enameling & Stamping Company, operated in connection with the St. Louis Coke & Chemical Company.

The salient feature of the Roberts invention is the baffle structure in the wall of the oven; this method of construction effects more rapid heat absorption from the heating gases in the combustion chamber than is generally the case in ovens of the flue-like construction.

Instead of the common regenerators to preheat the air, which were used in a previously designed oven for coking high volatile coal, the Roberts ovens are constructed with recuperators made entirely of silica brick which cover the whole space under the ovens, except the dividing wall. These recuperators are divided into two separate sections. The waste gases move through two passages in each of these sections; and each of these sections is made up of sixteen flues, arranged in four rows each. The air currents flow upward on the outside of the flues, through which, on the inside, the gases move in the opposite direction. The primary and secondary gas manifolds at the top of the oven are rectangular in shape and are separated, one side for the primary gas and the other side for the secondary gas. The primary gas is introduced through a hole four inches in diameter, and lined with fire-clay tile, cut with a three-quarter-inch hole.

Some Details of Operation

As the air passes upward out of the recuperators, it rises through the center wall, and fills the top of the oven chamber, after which it passes over the wall and downward into openings on each side of the hole through which the primary gas passed. At the primary gas orifices only 50 per cent of the total gas required for the coal carbonization is introduced, while 100 per cent of the air required enters the port through which the primary gas was introduced. The other 50 per cent of the necessary gas is introduced through the secondary openings, and this gas passes through ducts extending from the top of the wall through the center wall to reach those ports. The gas enters the combustion chamber through inclined rectangular openings in the brick.

Products resulting from combustion accumulate in the upper single flue and are thence directed through ports, regulated by means of slide brick, into the lower flue. Here they are brought to the end of the oven and pass downward into the first top of the recuperator. From the lower section of the recuperator these products are discharged into the waste gas outlets. Butterfly valves are used to regulate the draft to each oven.

In the concrete foundation which supports the oven structure, there are seven ducts, through which the air enters from both extremities of the batteries. The air then passes through the parts on top of the first course of fire-clay brick into the lower chamber of the recuperator. Cast-iron slide dampers to regulate the quantity of air introduced have proven very suit-

able and satisfactory, because of the fact that atmospheric temperature is maintained in the concrete work beneath the ovens. This eliminates the necessity of solutions of expansion problems in that phase of the installation.

Simplicity of construction and the minimization of operating costs characterize these ovens. This is illustrated here in the arrangement whereby there is no point in the oven where regulation of both air and gas, or products of combustion, depends upon the usual combination of regulator dampers. The butterfly valves in the waste gas offtakes regulate the draft, and the slide bricks on the ports of the upper sole flue regulate the distribution of the draft. The slide brick on the top of the wall regulates the amount of air entering each primary burner, and the adjustment of the cocks placed at intervals on the distribution manifolds along the top of the oven regulates the amount of gas entering the wall at any orifice. Holes, varying in size according to the width of each oven, are drilled into the plug which stops up the individual cocks, and this regulates the quantities of gas entering. Thus, the amount of gas introduced into each oven is regulated by the pressure carried on the main header and, since the constant pressure is known, the quantity of gas entering each of these drilled orifices, of known size, can easily be ascertained. By means of this arrangement, the quantity of gas entering per unit of time can be varied by the simple operation of regulating the pressure upon the main header. This is done by the use of governors instead of changing the sizes of the orifices in each of the cocks. These arrangements do away with the use of regulator dampers. All that is necessary from this point on, in the coking process, is the prevention of the carbon accumulation on the burners.

Blower Supplies Pressure

A common high-speed blower supplies the pressure, usually one pound, in a separate header, from which an auxiliary pipe connection extends to the ends of the gas manifolds in the secondary chambers, and the same method of gas regulation is employed here as in the primary. The air, at one pound pressure, is allowed to pass through the secondary gas ducts about once every eight hours, after the gas entering these ducts has been cut off. During this period, it has been found that from 1/16 to 1/8 in. of carbon has formed on the walls of the ducts but, since this carbon is at red heat, combustion is begun immediately upon the introduction of air into these ducts, and the carbon is burned out in about fifteen minutes. Since the temperature after this fifteen-minute decarbonization period is greater than before, and the products of the combustion resultant from this decarbonization hold sufficient heat so that there is no deleterious effect upon the heating conditions of the lower part of the wall, it has been proven that no heat loss is suffered. Furthermore, this arrangement has eliminated any trouble that might have arisen were the gas introduced through the secondary ducts. For the greatest economy, it is necessary that this decarbonization process be employed at regular intervals.

The lean gas, still containing the benzol, is used for fuel, for as yet the benzol equipment has not been installed at the plant; but when the facilities are ready to produce the debenzolized gas it will not be necessary to decarbonize the ducts more than once every two or three days.

This design has not as yet been adopted as standard, for certain conditions yet prevail which prevent that at present. Notwithstanding the fact that the operation of this oven has been practically experimental, with the use of the recuperator, no attempt has been made to evolve a method to economize the quantity of gas used, but with the knowledge gained through this period of experimentation, it is certain that it will be possible to construct a standard oven of the recuperative type that will be as economical in the consumption of gas as any regenerative oven that has ever been built.

To obtain the benefit of maximum tonnage, using narrow coke oven chambers, the ovens are built to a height of thirteen feet nine inches for, since the ordinary lean coke oven gas of high oxygen content burns with a short flame, the gas must be distributed and burned while maintaining a uniform temperature in the high wall. In the coke oven wall, the Roberts standard type of construction is used, which provides for a combustion chamber permitting communication throughout its entire length except where the baffle structure appears, partially isolating the three end burners. The extra heat required to keep the ends at uniform temperature with the other sections of the wall is provided for by means of the baffles, with the aid of draft regulation.

The introduction of gas into the coke-oven wall at more than one point in its elevation does not present any operating difficulties, for, although it is a common theory that heat localization at the point of combustion could be effected by furnishing all of the air necessary to burn the gas at that point, the operation of the Roberts ovens has disproved this theory since only 50 per cent of the gas is introduced at the point where 100 per cent of the air is taken in. Then, as it is necessary to bring the excess of the 50 per cent of the air up to flame temperature, the latter is reduced or tempered by the excess air. The point where the air and gas first meet is a mixing chamber, or short flue, so the rate of heat extraction is lower than it is further down in the wall. Naturally, the interruption of the flow of gas in this coke-oven wall causes a higher rate of heat extraction from the flame than would be caused in the flue type of construction.

Rate of Combustion Retarded

The rate of combustion is materially retarded at the point where the secondary gas is introduced, for here it mixes with the products of combustion which result from the primary introduction. Then this gas enters through the section of the wall in which it is constantly slowed down by the brickwork obstructing the combustion chamber. Practice has suggested that it is advisable to keep the bottom of the coke-oven walls at a higher temperature than the tops, especially at rapid-coking times, but the two sections may be maintained at uniform temperatures without much difference in results.

Because of the fact that the inner sides of the walls of the ovens are lined with fins, exposed to the heating gases, there is a more rapid absorption of the heat than would be the case if the walls were smooth.

At the point in the lower pass of the recuperator

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where the waste gas is emitted a temperature of 750 deg. Fahr. prevails when operating at the fifteen-hour period of coking. When the ovens are run at the longer coking period—that is, eighteen to twenty-two hours—the waste-gas temperature runs very much lower; calculations show the temperatures at the longer coking time vary from 350 to 400 deg. Fahr. On occasions when the coking time was speeded up and accomplished in twelve or thirteen hours the temperatures of the waste gas rises to 850 deg. Fahr.

Air leaving the top of the recuperator attains a heat of from 1,670 to 2,000 deg. Fahr. when the oven is operated at the normal coking time—fifteen hours. Varying with the conditions of operation and the temperature of the brick through which the heated air passes at the above temperature, the wall is also heated and attains a temperature of 250 deg. Fahr., increasing 150 deg. over its normal heat.

Continuous Flow of Heated Air

This heated air returns in the closed cycle to the heating wall with the new products of combustion, so that there is a continuous flow of heated air at the same temperature, and the heat is not lost; this condition is just the opposite in the regenerator oven of the reversing type and, furthermore, the gross efficiency is just as high as could be attained by the use of a regenerative oven.

The expansion of the recuperator can take place independently of the oven structure, by the use of two silica brick walls, corbelled in at the top to form the bridge above the recuperator top; these silica brick walls are eighteen inches in height. Thus, it would not necessitate the interference with the setting of the upper part of the oven structure to reset the brick in the lower section. The insulating brick in front of the recuperators is formed by independent buckstays on the bulkheads, controlled by screws from the main buckstays so that the position of these smaller buckstays can be adjusted to the desired point without regard to the position of the main buckstays.

The tension of the vertical joints in the recuperator is not affected by the difference in the temperature of the waste gas in the upper and lower passes for the coefficient of expansion in silica brick is very small up to about 1,200 deg. Fahr., and the waste gas in the pass does not attain a higher temperature than 500 deg. Fahr., consequently there is little variation in the rate of expansion. In a curve representing the expansion of silica brick, the lowest temperature to which the recuperator brick is exposed meets the flat part of the line, and will permit a variation of about 300 deg. without sufficient change of position to affect the joints.

Coking Time Varied

The time required for coking has varied as much as from twelve to twenty-four hours. It has been found, in changing from one coking time to another, that the overall efficiency of the recuperators for heat recovery is materially affected. Experimentation with the recuperator type of oven has led to the conclusion that an oven can be constructed along these lines that will render an efficiency score as high as any other process for heat recovery and will not, it has been proven, be sufficiently affected by the wide variations to which it must be subjected in operation to lessen the length of service period. However, the initial cost of the recuperator type of oven is greater, undoubtedly, than the regenerator type, but when the economy of operation, through the elimination of reversing equipment and valves, etc., is considered, the relative cost is practically the same.

Peculiar to the Roberts type of oven wall, because 100 per cent of the air is introduced at the primary gas duct, together with 50 per cent of the gas, the combustion taking place in the mixing chamber, the flame temperature is reduced to a very perceptible degree, causing in turn a more uniform distribution of heat in the entire length of the wall. The baffle structure of the oven begins below the point where the gas is introduced, so here more of the surface is exposed to the flame, resulting in a higher rate of heat extraction. Thus the heat effect upon the coal is increased to a greater degree due to the baffle structure than would be the case were the gases not regulated by these conditions.

The reduction of the temperature consequently follows, but this is desirable because of the fact that the heat is transferred to the coal from three sides at this point. The problem of the high wall is solved in this process in the theory that because the relative temperature of the upper zone and of the lower zone is arbitrary, according to the relative quantities of gas introduced at the two points, which offers a solution for that heretofore difficult problem. By employing the use of the Roberts type of oven-wall construction, narrow coke oven chambers can readily be built which would still produce the maximum capacity of the oven. It has been the general belief that in order to coke Illinois coals, it is necessary to use narrow coke ovens, but during the period of operation with the Roberts ovens this theory has been upset, for it has been found by their use than greater economy can be effected by narrow chambers and short coking time than by wide ovens and longer coking time. High volatile coals do not require wide ovens; the entire heat application can be shut off from one side and coke the coal with the heat obtained solely from the opposite side, which would be the equivalent to an oven twice the width of the narrow ovens used.

Similarly, the heat conditions throughout a long and high wall can be better controlled than through any other kind of wall, if small quantities of gas are introduced at any given point. In the Roberts oven, there are ninety-six different points at which the gas is introduced, in forty-eight primary and forty-eight secondary orifices, evenly divided on either wall. Inspection of the gas at these inlet points is facilitated by this method of gas introduction, which accounts for the minimization of wide variations in the heat effect from combustion, for the gas can be handled at any point at which a variation might occur.

Another theory which has been disproven by the use of the Roberts ovens is that of the velocities of the gases through the wall. It was generally believed that these velocities are necessarily greater than 3.18 ft. per second, but actual operation has proven that figure to be the maximum velocity through any point in the wall.

Table of Results

The following table gives the actual results accomplished since the installation of the ovens of the St. Louis Coke & Chemical Company, at Granite City:

Total coal per oven per day—tons.....	23.90
Average coke yield—per cent	67.21
Average coke breeze—per cent	3.70
Average charge of coal per oven—tons....	14.50
Average coking time .....14 hr.	56 min.
Average tar yield per ton of coal—gallons..	7.21
Average sulphate yield per ton of coal—lb.	23.70
Average total gas yield—cubic feet.....	10,248.00
Average rich gas—B.t.u.	593.00
Average fuel gas—B.t.u.	517.00
Average surplus gas—per cent	40.00
Average fuel consumption—per cent	60.00
Average Analysis of Resultant Coke—	
Moisture—per cent	4.44
Sulphur—per cent	1.13
Volatile matter—per cent	2.47
Ash—per cent	13.06
Average weight per cubic foot—lb.....	28.00
Shatter test on size No. 1 in.....	86.44
Shatter test on size No. 2 in.....	51.52
Shatter test on size No. 3 in.....	13.12
Shatter test on size No. 4 in.....	2.60
Average porosity—per cent	55.00
Average Analysis of Coal Used—	
Moisture—per cent	8.06
Sulphur—per cent	1.38
Volatile matter—per cent	34.51
Ash—per cent	9.35

From the above table we see that the amount of breeze is only 3.7 per cent of the total coke produced. Heretofore it has been believed that the use of such highly volatile coal would necessitate the loss of a great amount of breeze, but these figures, based on actual operation, prove this untrue.

In addition to disclosing some interesting information relative to the character of the coals used for coking, the above table shows that the quality of the coke produced is good, and that although it undoubtedly requires more heat for the production of coke from this kind of coal than from regular coking coal, yet the yield is good and its quality has been tested to satisfaction in the blast furnaces which, as explained hereinbefore, are operated in conjunction with these coking ovens at Granite City.

It had been thought advisable before the tests were run that the mixture of low volatile coal with the Illinois and Indiana coals would be necessary, or would increase the strength of the coke, in the use of Roberts ovens, but the tests and continued operation of the blast furnaces prove that 100 per cent Illinois coal produces as much tonnage, if not more, and is just as satisfactory as any other coke would be, resulting from the mixture of the low volatile coals with high volatile coal.

R. H. Burdick Writing for "Journal"

First Article of Series to Appear in Next Issue

R. H. Burdick, chief gas engineer of the Electric Bond & Share Company, has been added to the list of contributors to the AMERICAN GAS JOURNAL, and his first article, "Criticism," will appear in the next issue. This will be the first of a series that will appear during the coming months. In speaking of this article Mr. Burdick says: "It touches only certain high spots and is intended as a preliminary to a succession of more detailed articles."

Mr. Burdick is recognized as one of the foremost engineers of the country, and his experience has been wide and varied. He is one of the most quoted men in the business to-day, and his opinions and thoughts are constantly sought. The JOURNAL believes that it is rendering a real service in persuading Mr. Burdick to take the time to discuss the many problems that we have confronting us.

Mr. Burdick was born at Syracuse, N. Y. He had the usual public and high school education, and studied engineering in Columbia University.

From January, 1908, to July, 1910, Mr. Burdick was connected with the Consolidated Gas Company of New York as assistant superintendent of the Twenty-first Street water-gas plant and as assistant engineer of the Central Union coal and water-gas plant.

Mr. Burdick next became superintendent for the San Diego (Cal.) Gas & Electric Company. He remained with this company for two and a half years, from August, 1910, to November, 1912. The San Diego plant was a combination of crude oil gas works and electrical central station.

During the past ten years, from 1912 to date, Mr. Burdick has been with the Electric Bond & Share Company, and now has charge of gas affairs of thirty-three gas situations. These are divided as follows: Natural gas, 5; coal gas, 8; water gas, 10; mixed coal and water gas, 6; crude oil gas, 3, and coke oven gas, 1. His present duties embrace all phases of the business, including design, construction, operation, rates, etc.

Mr. Burdick has several high aims for the gas business, one of which is the production of gas through large plants with high-pressure transmission to groups of cities. Mr. Burdick also would like to see the day come when gas can be manufactured by such processes and in such volume as will permit its sale at a low price for all classes of service, including heating and power service.

Mr. Burdick is a strong advocate of a low B.t.u. standard, and he would like to see the day come when a cubic foot of gas will contain 300-350 B.t.u.

Regarding rates, Mr. Burdick would like to see that time come when there will be a universal system of charging.

Mr. Burdick has long been known as one of the most progressive engineers of the country, and he has created wide following for some of the innovations he has introduced. He is a member of the American Gas Association and of the National Electric Light Association. Until just recently he was on the executive committee of the Gas Power Section of the A. S. M. E., and he was one of the first engineers to be licensed to practise pro-

fessional engineering under the new New York State laws.

With this wide experience to back him up, Mr. Burdick is sure to contribute to the literature of the gas industry much constructive thought. He has many suggestions to make to the industry for improvements and changes, and in his criticisms, while he has been constructive, he has not hesitated to point out what he considers are mistakes.

Mr. Burdick has selected the AMERICAN GAS JOURNAL to tell his story to the gas industry because he appreciates the fact that this paper has long been recognized as the leader in its field and is constantly striving for improvements, and because he is assured of the widest possible audience.

To Continue Research Work in Coal Mining

Through the efforts of the coal operators of western Pennsylvania, another year of extensive research work in coal mining will be conducted by the Co-operative Department of Mining Engineering of Carnegie Institute of Technology and the Pittsburgh Experimental Station of the United States Bureau of Mines. The research will be carried on through teaching and research fellowships appointed by Carnegie Tech and supervised by senior investigators in the experimental station.

The establishment of four fellowships to do this work in 1922 and 1923 is an indorsement of similar investigations conducted this past year at these institutions. Four fellowships were established a year ago by the advisory board of coal operators of the Co-operative Department of Mining Engineering, at Tech. They also chose the problems for the research work. The Pittsburgh district is the first to take this progressive step in solving the problems of coal mining. When the results of the research work are broadcasted, the whole industry should be benefited.

The investigations of the four research fellows conducted the past year are completed and reports will soon be available to the coal industry. For the coming year appointments have already been made by the Co-operative Department of Coal Mining to begin the work in September. The problems selected by the advisory board of operators have been assigned to the fellows in accordance with their specific training and adaptability. In making the appointments, applications were considered from all parts of the United States, reflecting the wide interest at large in research work of coal-mining problems.

The four problems to be investigated, as recommended by the advisory board, are: (1) Desulphurization of coke; (2) corrosion problem with regard to acid mine waters; (3) microscopic study of the Pittsburgh coal seam; (4) by-product study of the roof coal of the Pittsburgh coal seam.

The appointments and assignments for 1922-1923 are:

Teaching Fellow—John H. Thompson, B.S. metallurgy, 1922, University of Washington; under Dr. Alfred R. Powell, physical chemist, of the United States Bureau of Mines, senior investigator.

Teaching Fellow—V. F. Parry, B.S. mechanical engineering, 1922, University of Utah; under Joseph D. Davis, fuels chemist, United States Bureau of Mines, as senior investigator.

Research Fellow—J. Richard Adams, B.S. physical chemistry, 1922, Cornell University; under R. J. Anderson, metallurgist, United States Bureau of Mines, as senior investigator.

Research Fellow—James U. Staud, B.S. geology, 1922, Pennsylvania State College; under Dr. Reinherdt Thiessen, research microscopotist, United States Bureau of Mines, as senior investigator.

The results of the research investigations carried on this past year are being prepared for publication. The following problems were studied:

1. Relative tendency of various Pennsylvania coals to fire spontaneously with particular regard to the influence of different coal constituents; made by J. S. Byrnes, B.S. metallurgy, under Joseph D. Davis, fuels chemist, United States Bureau of Mines.

2. Investigation of acid-resisting materials suitable for use in coal mines; made by George N. Enos, B.S. metallurgical engineering, under W. A. Selvig, United States Bureau of Mines.

3. Microscopic study of the Freeport coal bed with a view to the economic utilization of the bone and cannel constituents; made by A. W. Voorhees, M.S. in geology, under Dr. Reinherdt Thiessen, research microscopotist, United States Bureau of Mines.

4. Study of the gas, oil and other by-products from the bone and cannel constituents of the Freeport coal bed; made by H. G. Berger, B.S. in chemistry, under Joseph D. Davis, fuels chemist, United States Bureau of Mines.

Each of these four junior investigators who held fellowships was graduated with a master of science degree in mining engineering at Carnegie Tech in June. Because of their capable work during the year all of them have been retained by the United States Government.

Picture Yourself in "Workin' Clothes"

By ROBERT S. MERRILL

Say it with figures—but be careful of the language you use.

How many miles of mains has your company? You may not have as many as New York and Chicago companies, but what you have will look just as impressive to the people in your town as the mileage in the larger cities does to the residents there.

Tell it like the Peoples Gas Light & Coke Company, of Chicago:

"If the gas mains of this company, which represent a large investment and enormous tonnage, were to be placed so as to form a single continuous line, this line of pipe would extend across the United States from San Francisco to New York and, in addition, from Chicago, Ill., to Memphis, Tenn."

Will your lines reach to the next big city? Well, tell just how far. This will do two things: It begins to impress people that a gas company has to pay out *some* of the money it takes in; it may impress many who are not using gas that they should have connections made. Perhaps such information as this may appear in your advertising space on the very day that a syndicate cartoon appears in another column of the paper—"It Never Happened—The Gas Company Cheerfully Refunds an Overcharge."

How many customers have you? You may be in a small city and still have enough users to make up the population of a near-by county seat. However, in your advertising of such facts like this emphasize the work

and expense that are necessary to give good service to such a large number of people. It makes errors and unavoidable delays more understandable.

Estimate the number of patrons cooking with gas, averaging five members to a family. How many times would they fill and refill the dining-room of a well-known hotel or restaurant or the banquet room of some lodge hall?

Suppose all your customers were back in the wood-stove burning days. How many "kid" ball games would be delayed because eighteen youngsters from each game had to fill up the wood-box? A headline on that order will interest the juvenile portion of the family as well as the elders. It also is a real picture of the convenience and cleanliness of gas for cooking.

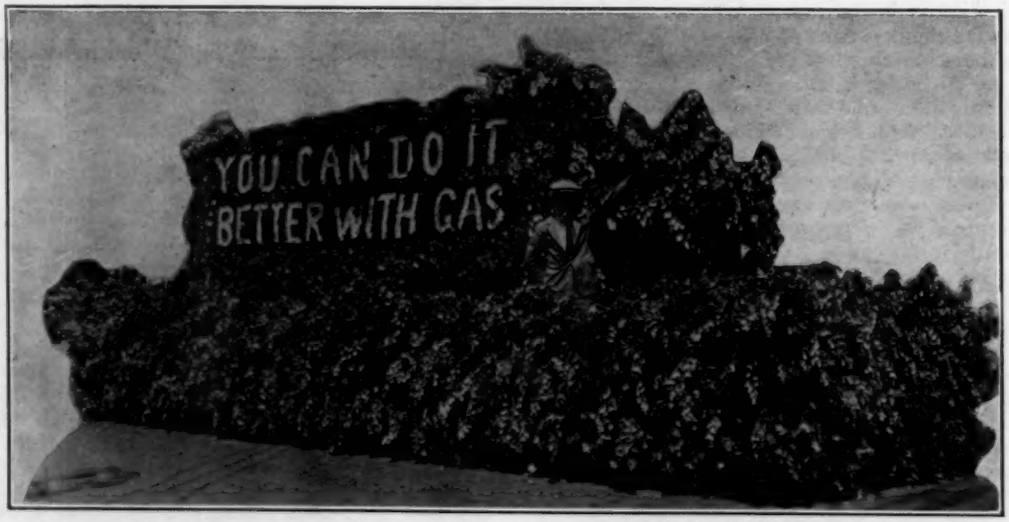
These are only suggestions of an interesting angle for gas company advertising. The public is willing to listen to facts about the company, but it does not want to be bored. Appeal to the imagination by making comparisons. Invite the employees to submit ideas if you have a suggestion box.

In this way you can pass around some lifelike pictures of the gas company. And you will find that pictures of you in "your working clothes" will be more welcome in the "mental family albums" than any poses.

A Gas Float That Floated

By J. H. Hartog

The Rose Festival, celebrated every year in Portland, Ore., generally puts a crimp in the appliance business. The more interesting the festival is, the less desire people have to talk business. But every cloud has its silver lining, and so it happened that this year the Portland Gas & Coke Company had a lot of free and valuable advertising in the big floral parade held June 23.



It happened thusly: The gas company had been requested to enter a float, as the two electric companies had agreed to take part in the procession. Whatever advertising was on the float had to be in flowers. In order to make it as short and snappy as possible it was decided to put the motto "You can do it better with gas" in flowers on the foliage decorated with roses. The motto was adopted from a picture appearing in the American Gas Association Monthly. There is nothing particularly humorous about the motto and yet it created more smiles on the faces of the populace than anything in the whole parade. It stands to reason that all Portland was out to see the chief feature of the festival, and the value of the impression made upon the public's mind at such a time is incalculable. The reason for the amusement the float caused was that the committee in charge of the formation of the parade had decided that the Northwest Electric would come first. Their splendid float, advertising heat, light and power, was much admired and was followed, according to instructions, by a beautiful float advertising the Portland Railway, Light & Power Company, and as these trucks slowly moved along and the gazing multitude was taking it all in the gas company's float followed, telling the people—

"You Can Do It Better with Gas."

It caused considerable merriment and comment. What was most interesting of all to a gasman was that people said, "That's right. Not only better, but quicker."

Utility Securities Favored by Small Investors

The recent oversubscription of the $5,000,000 7 per cent preferred stock offered by the Wisconsin Bell Telephone Company is an interesting sidelight on who own the public utilities, and of the great favor in which these securities are held, particularly by the thrifty of modest financial means.

More than 120 trades or professions were represented in the list of 11,283 subscribers, an analysis of the subscriptions showed.

"The stock was subscribed for by persons in virtually every walk of life," said W. R. McGovern, president of the company. "Included in the list are bootblacks, bankers, mechanics, artists, farmers, laborers, manufacturers, housemaids, newspapermen, doctors, clergymen, butchers, bakers, teachers, salesmen—yes, and even forty-nine men who still gave their occupations as bartenders.

"Of the total of 11,283 stock subscribers, housewives led in number with 2,148 buying 10,410 shares."

Thermit and Electric Welding

Some of the Dangers That Must Be Avoided

Welding and cutting metals by means of a blowpipe flame and by the electric-arc process has made rapid progress during the past few years and to-day promises to revolutionize the manufacturing of metal products. Already a large percentage of small metal articles are joined piece by piece by the use of these methods. Even the heavy steel hulls of ships have been apparently satisfactorily joined by welding instead of riveting.

It is to be expected that unskilled workmen and makeshift outfits will be found in a trade that has grown up so quickly. It takes from six to eight weeks to train a man properly in the art of welding, and work of importance should not be tried until the worker has become efficient at using the apparatus. Some companies take the precaution of requiring operators to pass an examination on the fundamentals of the process before they are permitted to do any welding.

Kinds of Welding

There are three general methods of making welded joints without using the hammer which have branches or subdivisions as shown by the following:

Gas Welding—Oxygen-hydrogen, oxygen-acetylene, oxygen-carbo-hydrogen, oxygen-other combustible gases (thermoline, blau gas, Pintsch gas, etc.).

Thermit Welding.

Electric Welding—Arc welding (carbon electrode, metal electrode); pressure welding.

The comparatively low temperature of the oxyhydrogen flame makes it unsatisfactory for welding except for work of thin section and for certain allowed metals; it is, however, used to advantage for cutting. Illuminating gas, blau gas and several other hydrocarbon gases give a somewhat higher flame temperature and can be employed for welding; they are, however, more suitable for cutting and are generally so used. Carbohydrogen gas gives a reasonably high flame temperature and is extensively used for cutting. It may also be used for welding cast iron and the softer metals, such as brass, copper and some alloys. Acetylene gives a higher flame temperature than the other combustible gases, and for this reason is generally considered the best for welding purposes. It is also widely used for cutting.

Thermit welding is a valuable process, particularly adapted for heavy work such as joining track rails and repairing crankshafts and locomotive side frames.

The arc process is the most adaptable form of electrical welding. The electric arc is also used to some extent for cutting. Spot and butt welding have for several years been successfully used on light work, and recent experiments on heavy work, like joining ship plates, give good results under proper conditions.

Safety in using any one of these methods depends on good equipment and careful handling rather than on any special advantage in the method itself. They are all good in their proper place and all safe methods if used with care. If they are not so used, any one of them may cause great loss of life and property.

In this article we shall describe safe practices in thermit and electric welding.

Thermit Welding

Thermit welds are made by igniting a mixture of aluminum and iron oxide in a retort and running the iron that is reached by the heat into a mold around the weld. This method of welding is useful when many welds all alike are to be made and in heavy work like welding track rails in paved streets or in repairing locomotive frames, crankshafts, or other large parts.

Combustion is started by first placing a small quantity of ignition powder (barium peroxide) on top of the mixture and lighting it with a hot body or spark. Once started, combustion proceeds with great energy, raising the temperature to about 5,400 deg. Fahr. The iron is reduced from its oxide and the aluminum is changed to aluminum oxide. The iron flows into the mold around the weld, fusing the parts and making the bond between them.

Few hazards are met in this operation. The weld should be thoroughly dried before the charge is lighted. The crucible should always be provided with a cover. When the charge has been ignited, the operator should stand a few steps away and should wear goggles; those suitable for other forms of welding can be safely used for this method. Painful burns may occur by the metal splashing, or by upsetting the crucible, or by the breaking of the mold. Slight injuries frequently occur from taking hold of the apparatus or welded parts before they are cool.

The mixture of aluminum and iron oxide is neither explosive nor inflammable at ordinary temperatures, hence few precautions in handling it are necessary. It should, however, be stored in a dry place.

The ignition powder is furnished in airtight containers, which should be carefully stored, preferably in metal bins. These containers should always be kept securely covered to prevent ignition from sparks as well as deterioration. Under no circumstances should the powder be applied to crucible until charge is ready for lighting.

Electric Welding

Both arc and pressure welding have their own peculiar advantages and advocates. Many kinds of work can be done by either process, and there is a difference of opinion as to which is the better. The whole art is in such rapid development that longer experience is necessary before it will be known for what kind of work each method is better adapted. Arc welding is slower and requires more labor, but it can be done with lighter and cheaper equipment and in locations where spot welding is impossible. Pressure or spot welding requires relatively heavy and expensive equipment, but the process is easy, rapid and cheap.

Either direct or alternating current can be used for arc welding, though it is not settled which is better. Direct current gives a steadier arc and is in more gen-

eral use. The current required, the temperature produced and the quality of the work are about the same for both. The current varies from a few amperes for thin material up to 1,000 amperes for very heavy work. The voltage varies from 10 to 115 volts.

The positive side of the electric circuit (direct current) is connected to the work and the negative side to an electrode which is used as a tool by the workman. When the current is turned on, the electrode is touched to the work and then drawn away an inch or so. An electric arc of varying length and intensity is thus made between the work and the electrode. The high resistance of the air gap causes the metal at the weld and the end of the electrode to become heated to a temperature around 6,000 deg. Fahr. The metal fuses can then be welded or cut.

Electrodes for arc welding are made either of carbon or metal. The carbon electrode is a solid pencil of hard carbon ¼ in. in diameter or larger, depending upon the amperes used. Pure graphite has been used, but is expensive and easily broken. Metal electrodes are usually made of nearly pure iron in sizes of from 1/16 in. diameter for thin work up to ¼ in. for work requiring a thousand amperes of current. The arc of the metal electrode is not so steady and is more sensitive and shorter than that of the carbon electrode. It has the advantage of carrying metal to the weld without the use of filler rod, and for this reason can be used for making vertical and overhead welds. Only carbon electrodes are suitable for cutting.

Covered electrodes composed of a metallic core with a covering of asbestos yarn have been recently used with great success in welding and promise to replace both the carbon and pure iron electrodes for this process. The covering is a ferrous silicate coated with a sodium or aluminum silicate to vary the fusing temperature of the yarn, and often mixed with a small quantity of smoother metal which has a reducing action on the molten metal of the weld.

The most necessary accessory is the electrode holder. This is a simple clamp made of light material and designed so it will be easy to hold and not overheat. In case there is overheating of the holder it may be cooled in a bucket of water.

Arc welding machines are being developed with which the electrode is automatically carried along the weld, or cut, with a steady motion and constant speed. These machines when perfected will undoubtedly reduce the hazards of the work and increase its efficiency.

Pressure Welding

In this method the edges of metal plates are brought together and the positive and negative sides of an electric circuit are connected, one to each plate. When the current is turned on, the temperature rises to about 6,000 deg. Fahr. and the metal is fused. Pressure is then applied and the edges are welded. When used for welding wire, it is called percussion welding. In spot welding the parts to be welded are brought in proper position between two electrodes and a pressure applied as the current is turned on.

Either direct or alternating current may be used, but the process would seem to be more suitable for alternating current, because it is easy to transform it so as to get the high amperage required for heavy work. Alternating current has undoubtedly been more successfully used up to the present time. The energy required is about the same as in arc welding, but the current is sometimes stepped up as high as 50,000 amperes or more with only four or five volts difference of potential.

Welding equipment is much like other electrical machinery, for the installation and operation of which the provisions of the National Electrical Safety Code and National Electrical Fire Code should be followed. In large installations a competent electrical engineer should be in charge. Practically the only dangers which need be guarded against are such as are due to shocks, burns and injury to the eyes. The voltage in most cases is so low that there is little danger of shock from the welding circuit, but the usual precautions should be taken against coming in contact with high-line voltages.

All the light rays in the spectrum are given off by the welding arc. The infra-red rays, which are invisible to the eye, produce a sensation of heat. Orange-yellow and green are the illuminating rays which make objects visible. Blue rays obscure the vision and make objects indistinct. The ultraviolet rays are invisible and, while they cause no immediate discomfort, they are very dangerous. They affect the skin like sunburn and may cause cataracts and even total blindness if looked at with the naked eye.

In welding, because of the great intensity of the arc (6,000 deg. Fahr.), it is of the utmost importance to provide lenses which will protect the operator from the injurious effect of the radiations. A glass which will reduce the brightness of the arc is not necessarily a suitable one for protection against the injurious infra-red or ultraviolet rays. Blue lenses are not satisfactory, as they do not protect against the harmful rays. Amber, yellow and greenish yellow are the most efficient for eye protection, being the most opaque to the injurious light rays.

Several reliable dealers are now able to supply glass which will provide sure protection against injury from the welding arc. The glass should be scientifically correct; that is, should show by a spectrum analysis that it does not permit the passage of an appreciable amount of the harmful rays. The Bureau of Standards has recently issued a paper (No. 93, "Glasses for Protecting the Eyes from Injurious Radia"), giving information concerning the protective properties of various glasses now available.

The face of the operator must also be protected from the heat rays; therefore a shield (held in the hand or supported from the shoulders) or a helmet (worn on head or supported from shoulders) is necessary. The helmet offers the greatest degree of protection, since it protects the operator from reflected rays while the shields do not. The protective glass is usually inserted in this shield or helmet, as the case may be. In some cases, however, the welder wears goggles fitted with light shade protective lenses, and the shield or helmet is fitted with a light shade protective glass, the density of the two glasses giving the required color.

On account of the intense heat of the welding arc, operators sometimes wear an asbestos apron or bib. Gloves are also often worn to protect the hands. Woolen clothing is preferable to cotton because it is not so easily ignited. It is recommended, however, that arc welders wear only fireproofed outer clothing.

The reflected rays sometimes cause skinburn of operator's face or back of neck. It has been found that if the inside of welding room, draw curtains, etc., are painted black this will be largely avoided.

The Gas Water-Heater Market*

What We Must Do to Accomplish Results

By F. A. LEMKE, Kalamazoo, Mich.

The slogan, "Cook with gas," has lived many years. In what has been accomplished under its inspiration, it signifies the sale of an idea. That this is so is evidenced by the fact that with some 9,000,000 domestic and industrial gas meters in service, some 7,000,000 gas stoves have been made and sold, and the end is not yet.

Statistics also show that only about 1,500,000 gas water heaters have been marketed—1,500,000 of all types, tank water heaters, instantaneous bath water heaters, automatic instantaneous and automatic storage heaters—about one gas water heater to each five gas stoves. The American Gas Association estimates a possible market tremendously alluring in its promise of heavily increased sales of gas on existing mains, services and meters at little or nothing in additional capital investment, a steady business that once secured, endures year after year, practically independent of business conditions.

Reference to a national table of gas consumption develops some interesting and stimulating thoughts and makes very prominent why so much is heard here and there over the so-called "unprofitable customer," and the "small customer." This table shows the following:

Monthly Consumption	Consumers
Less than 1,000 cu. ft.	35 %
1,000 to 2,000 cu. ft.	30 %
2,000 to 3,000 cu. ft.	20 %
3,000 to 5,000 cu. ft.	10 %
5,000 to 7,000 cu. ft.	2½%
Over 7,000 cu. ft.	2½%

The generally accepted monthly rate of gas consumption from an automatic gas water heater is 3,500 cu. ft., from a tank water heater 500 cu. ft. It is evident, therefore, that the large unsold market that will be of the greatest aid in producing larger gas sales is the automatic gas water heater; that the sale of tank water heaters would be of only mild effect in altering this table of percentages. Therefore, the great unsold market for gas through "heating water with gas" is not to be reached through the hot plate of the water-heater field, the circulating tank water heater, but through the wide and general use of the automatic gas water heater.

Earlier this year a survey impressed this fact so strongly on the managing committee of the commercial section of the American Gas Association as to cause a resolution to be passed to the executive board of the association which is indeed a challenge to your interest and activity. This reads:

"The automatic water heater is the appliance toward the selling of which the most aggressive and continuous efforts of the gas company should be directed. It is the appliance which fills the greatest unsold market, promises the greatest increase in send-out, while efficiently serving and being adaptable to all classes of consumers.

"The managing committee of the commercial section, realizing that an increase of gas consumption by present consumers is more desirable than sales secured from new consumers which entail additional capital expenditures, is convinced that the largest unsold market in the domestic field is that of "gas hot water," and that the sale of automatic heaters, giving hot water service commensurate with the highest standard of household appliances, should receive from this time on a continuous and major effort by the member companies.

"In this connection the practical and desirable caution is given that water heaters equipped with burners that use large quantities of gas within very short periods be installed only after due engineering consideration has been given to main conditions, meter capacity, gas pressure and kindred auxiliary matters.

"There are but 1,500,000 gas water heaters of all types installed on the lines of gas companies, whereas nearly 7,000,000 gas cooking appliances are doing service so that it requires but little stretch of the imagination to see the wonderful possibilities in gas sales from the intensive cultivation of this unlimited field.

"Have you as many automatic water heaters in your town as there are automobiles or pianos, or victrolas? If you have not, here is a worthy goal for your efforts.

"The 5,000,000 unsold gas water-heater prospects will buy if the proper merchandising effort is put forth and there is every indication that gas companies throughout the country are again getting into the stride of intensive sales efforts.

"This is then the psychological moment to get your sales plans under way."

Of such large importance is this that the urge to make the sale of automatic water heaters a "continuous and major effort" is constantly being reiterated by the American Gas Association. The worth of this great waiting market needs no more emphasis—it is too self-evident—but how about the other fellow, the user, the millions who are to fill in this picture, will they profit, too? The question almost answers itself.

A Comparison

We are aware of the large sales already made, with more constantly being made, of washing machines. These are labor-saving devices as compared with hand labor, but are they worth their first cost, the cost of operation, their maintenance cost? The electric man says so—says so very positively and sells them. Buyers are pleased with them. By comparison where do we stand with automatic gas water heaters? We have the means to make the washing machine as fully as useful as it can be; it is useless without hot water. Yet we have not put over that

*Paper read at meeting of Empire State Gas and Electric Association.

more fundamental equipment and idea, "Heat water with gas," and "automatic gas water heaters." More people than we realize, and are probably ready to admit, stumble along day after day and year after year with a laborious, troublesome, scanty hot-water supply that is never ready and is never enough.

We can give them automatic gas water heaters. Once connected, nothing else in the home is called upon so often or for so much service; nothing else pays such great service returns, not to the maid, to the weekly wash woman, or even to the housewife alone, as is the case with the washing machine, and other labor-saving household devices of wide sale, but on the contrary, to the whole family, in time, attention and labor savings and in comfort, health and satisfaction. A healthful daily bath for every member of the family becomes a care-free pleasure. The whole drudgery of housework is lessened and all this without human effort, care or attention. All this at a cost less than if provided by other means. The automatic gas water heater is not a summer makeshift. It is a sound, economical convenience for all the year use. The coil in the furnace for winter use is not cheap. The coal water heater is not cheap. Contrary to what the many owners of coal water heaters will tell you, the smallest size of coal water heater requires no less than 1,000 lb. of coal per month to keep it going, and at $16 per ton that is $8 per month.

An Experiment

Compare that with the cost of 3,500 cu. ft. of gas. A few days ago a prominent advertising man from Chicago happened to be in Kalamazoo to see other people and called at our office because of mutual friendship. He stated that about a year ago he placed an automatic gas water heater in his home in Highland Park, Ill. He did away with a hot-water coil in his furnace, for winter use, and a coal water heater for summer use. Being fond of shower baths, he often exhausted the hot water available from his coal water heater. With the automatic water heater he never runs out. Because he is a wide-awake advertising man of an inquiring turn of mind he checked up to see where he stood on operating costs. He found that the removal of the hot-water coil from his furnace cut down his winter coal consumption three-fourths of a ton per month, which at $16 per ton for coal represented $12 per month. Estimating the coal used in this summer coal water heater as $8 per month, he saved that amount, and in addition he saved $2 a week which he paid a man to attend to this coal water heater. His gas bill has never exceeded $8 per month. So that he certainly saved, according to his own figures, $8 per month in the summer and $4 per month in the winter and had better service. This is a story of real service and value that proves "You can do it better with gas."

Value needs no apology and certainly in both service and cost of operation no one has such supreme value to offer as is found in the service and cost of operation of an automatic gas water heater.

How shall we sell them? First of all, we must know; we must be able to speak from experience; we must sell ourselves more thoroughly; officers, directors, department heads and principal employees should all be users, for if we are to put over thoroughly the idea of "Heat water with gas," our own business families must certainly be the starting point. Why shouldn't they be? Nothing else will give them the service so easily, so abundantly, and so cheaply. There are types and sizes for all; for the small, modest home as well as the larger one.

Don't Deride Our Own Product

Do we ever hear a coal man say he doesn't use coal because it is expensive? No, indeed. Yet that is about the attitude of many in the gas business toward their own business. That attitude is changing, to be sure, but to make automatic gas water heaters a successful, "continuous and major effort," there must be more changes. The whole organization from top to bottom must understand and have the idea, "Heat water with gas."

When the size of gas bills is mentioned, there is no reason to ask a customer, "Do you use an automatic water heater?" Sell the automatic water heater and sell the gas bill, too, as the telephone people have sold the telephone bill. With this done, there are other needs. Having decided upon a reliable, known line that has demonstrated the lasting stability to merit your confidence, a line you can get behind with positiveness and assurance, because the manufacturer is both willing and able to back you up in every way, make a pretentious display, one consisting of a full line of types and sizes, arranged so it will convey to everyone who sees it that automatic gas water heaters are something of outstanding importance. Too many water-heater displays are small and unattractive, with an appearance that, instead of creating confidence and desire, expresses quite the opposite. Why should the stove display be given so much space and so much prominence? Eighty per cent of the stove sales are said to be replacements that do not mean additional gas sales. Move the water-heater display up front. Make it unavoidably prominent. Take away some of the space now devoted to stove display and achieve the importance and the permanence that water-heater selling deserves, if you believe in a "continuous and major effort."

Sell the Plumbers

Line up all the plumbers and sell them the idea—"Heat water with gas. " Get the benefit of the additional publicity and prominence that will accrue from the use of plumbing stores as places for gas water-heater displays. Tie up with the efforts of the plumbers' trade-extension bureau in their nation-wide campaign, "Hot water for every need" and "A bath a day." The plumbers are interested now and their interest is growing. The National Association of Master Plumbers invited the American Gas Association to have a representative appear before their annual convention this year in Detroit, Mich. O. H. Fogg, manager of your great American Gas Association, addressed that great gathering of plumbers, and his remarks were received with applause.

The possibilities through a wider and more wholehearted co-operation with the plumbers should be more seriously considered, and given progressively increasing attention and effort.

(*Continued on page* 56.)

As the Journal Views It

Coke in Gas Manufacture

One of the outcomes of the coal strike has been the fact that numerous gas companies have been experimenting with coke for the production of gas, and according to reports they have found it is very efficient. In fact, one plant, after carrying on tests that lasted for several weeks, has ordered a large quantity of coke and it will be used during the winter months. Where a plant is self-contained, of course, this practice has been in vogue for years, but to many gasmen who have been depending on coal entirely it meant a radical departure.

There can be no doubt but that coke will do the work of coal in many instances, and will prove equally as efficient, and the strike has only hastened its use in many plants which were headed in that general direction.

Some gasmen believe that coke provides the ideal fuel for certain operating conditions, and this has proved to be true in every case where it was tested.

The demand thus created has reduced coke piles throughout the United States which were accumulating for many months prior to the strike. It has given new heart to many coke producers, who declared that the market was stagnant and that there was an overproduction. Not only has a new demand been created, but the prices that have been obtained for the coke thus sold have made the storage of it worth while. And from the gasman's standpoint the prices paid have not been excessive but have compared favorably with the prices of anthracite coal, even where prices have been fixed under a contract.

This use of coal by gas companies is a step in the right direction, and we are glad to see it. Even with the settlement of the coal controversy, this demand for coke for gas manufacture is going to continue and it should result in a savings in manufacturing costs. It is true that there is nothing new in the use of coke and that it has been used successfully for a considerable period, but it is likewise true that its usefulness was never as widely appreciated as it is to-day.

R. H. Burdick to Contribute

On another page will be found the announcement regarding R. H. Burdick, gas engineer, of the Electric Bond & Share Company, who is preparing a series of articles for the AMERICAN GAS JOURNAL. The first one, as stated, will appear in the next issue and will be a general introduction to those which will follow.

Mr. Burdick is recognized throughout the United States as being an authority on gas company organization and operation, and his statements will carry the weight that goes with knowledge of his subject.

The publication of the articles by Mr. Burdick is only part of the elaborate program that the JOURNAL has arranged for the coming months. It is safe to say that the foremost thought on all branches of gas company activity—whether engineering, chemical or executive—appears in the columns of the JOURNAL, and it is watched for by those who know. Added value is given to the various articles by their timeliness, for it is carefully arranged that all articles should appear when the subject is uppermost in the minds of gasmen generally. The JOURNAL, too, has taken the lead in pointing out the needs of the industry from time to time, and it has then secured authoritative information for the guidance of its readers.

While apparently the sixty-third birthday of the JOURNAL slipped by without any comment on the part of its organization, the gas industry has become so used to referring to its columns that it was felt that there could be no space spared from the many important matters that came up to stop, for even an instant, and discuss our plans. Instead we have decided that it was best that our readers learn for themselves our desires to serve.

The AMERICAN GAS JOURNAL is a paper published for gasmen by gasmen. The expressions of opinion and the ideas advanced are practical and have direct reference to the industry. There is no attempt made to drag in extraneous matter from other fields and offer it for consumption in this field. The JOURNAL deals with subjects that are of importance to the business, and not with theories that could have no basis in practice. This does not mean that the JOURNAL does not welcome that which is new or progressive, but it does mean that until a thing has been proved it will not go on record as advocating it.

That is the reason that the JOURNAL welcomes to its list of contributors R. H. Burdick.

The Gas Water-Heater Market

(*Continued from page* 54.)

Individually each plumbing and heating dealer may not have a great influence on the volume of the gas water-heater sales, but collectively the influence of the plumbers is a big factor and the total sales of all can be made to reach a substantial volume. Because plumbers have no interest in any appliance except from the merchandising standpoint, any arrangement entered into with the plumbers must be beneficial to them as well as to the gas company.

Getting orders requires salesmanship. There is no easy road to business in selling automatic gas water heaters. It is work—constant, consistent and persistent work. There must be someone in charge of automatic gas water-heater sales; someone able to decide the best type and size for every job; able to meet any hot-water need with the proper equipment; able, too, to post others, that the whole organization may be able to intelligently assist and may be kept sold on "Heat water with gas," if a "continuous and major effort" is made instead of occasional and temporary efforts. Such a man can make efforts continuous and can secure business the year round. He can offer steady employment that will make automatic water-heater selling attractive to salesmen.

Advertising to the Fore

This brings us up to the question of advertising. Probably 60 per cent or more of your newspaper advertising is devoted to gas stoves. Wouldn't it be well to make a wide change and devote a substantial part of newspaper advertising to automatic gas water heaters? The need of constant advertising in all of the ways so well known to all of you needs no comment. Too much of it cannot be done if you are to put over the idea of "Heat water with gas" through automatic gas water heaters as thoroughly as you have "Cook with gas." The more you tell, the quicker you sell, as the great Chicago *Tribune* says and proves. Only one point in that connection will I touch upon, and that is prospect lists for use in circularizing and in canvassing sales work.

In endeavoring this year to locate prospect lists, it was quite amazing to find what rarities accurately kept up prospect lists really are, and yet such a list is of such great value as to recommend it having the utmost care and attention and to thoroughly justify all the effort and expense necessary to keeping it up.

Further than this one point, much efficient aid and suggestion, available from the different manufacturers and from the American Gas Association, may be had.

It is my belief that in making "Heat water with gas" in automatic gas water heaters a "continuous and major effort" because "you can do it better with gas," the idea can be put over until 100 per cent of the gas consumers are doing it.

Developments in Gas Technology

Important Information Gathered from All Parts of the World

By ISMAR GINSBERG, B.Sc., Chem. Eng., Associate Editor

Purification of Water Gas

As is well known, water gas contains, in addition to sulphureted hydrogen, appreciable quantities of sulphur dioxide. This latter must be removed, as otherwise it will corrode the network of iron pipes through which the gas is distributed, as well as any metallic parts of apparatus, such as gas meters, etc., that it comes in contact with. A method of purifying the water gas, so as to remove all its sulphur dioxide content, is described in *Wasser und Gas*, volume 12, pages 454 and 455. This consists in mixing the water gas with coal gas before the latter has been put through the purification process. Then the ammonia that is found in the coal gas will react with the sulphur dioxide in the water gas, resulting in the complete removal of the sulphur dioxide from the gas.

By-products from Lignite

The recovery of valuable by-products from lignite is accomplished by processes which are patented in French Patents Nos. 532,288 and 532,229. The lignite is ground up very finely and heated together with tar oils, mineral oils, etc. The undissolved portions are filtered off. The solutions which are obtained in this manner can be used as lubricating oils without any further treatment. A solid fat is obtained by the addition of a saponifying agent. The pulverized lignite coal may also be heated in autoclaves with alkali lyes, and then the product may be mixed with heavy mineral oils. Then the mixture is decomposed with water while oxygen or air is being introduced therein. The mixture is cooled and the oily layer, located on the top of the same, is drawn off. It may then be converted into a solid fat by saponification with alkali lyes. This fat can be used as a lubricating grease for heavy bearings or as a wagon grease.

Gas Producer with Pre-drier

In German Patent No. 345,490, which has been assigned to the Aktiensbesellschaft fuer Brennstoffvergasung, there is described a gas producer which is provided with a pre-drier which is heated with superheated steam. The pipe leading the superheated steam to the drying chamber and the branch connection to the superheater is connected with pipe, which leads the air-steam mixture into the producer. This makes it possible to use in the air-steam mixture partly superheated and partly saturated steam in regulated proportions.

Sulphur from Gas

In this process of removing sulphur from illuminating gas, etc., a process which is patented in German Patent No. 350,271, the sulphureted hydrogen con-

taining gas is allowed to act on a strong solution of cupric salts which has been reduced with sulphureted hydrogen. The gas can be mixed with oxygen and then conducted through solutions of acid salts. The addition of salts of the alkaline earths accelerates the action of the absorptive reagent.

Removing Sulphureted Hydrogen from Gas

The gas is first washed with an ammoniacal solution of a copper salt. The sulphureted hydrogen in the gas is converted into the sulphide, which is contained in the solution, and the illuminating gas is freed from its sulphureted hydrogen content. The sulphide is then worked up further by being oxidized with gases, containing oxygen, under high pressure at the ordinary temperature. The product that is obtained in this manner is copper sulphate. This process is patented by the Gesellschaft fuer Kohlentechnik m.b.H. in German Patent No. 350,325.

The Effect of Chlorides on Distillation of Coal

In the *Journal of the Society of Chemical Industry*, volume 41, pages T 30 to 32, there is reported the results of investigation to determine the effect of the addition of chlorides on the production of ammonia compounds on the distillation of the coal. Ordinary salt was used for this purpose, and the coal, which had been previously washed free from chlorides as far as possible was distilled with various proportions of salt at various temperatures, varying from 650 to 750 and 850 deg. Cent. Calcium and magnesium chlorides were also used in the experiments. The results of the experiments indicated for one thing that the presence of the chlorides in the coal tended to promote the volatilization of the iron in the ash and the occurrence of iron compounds in the gas. At a temperature of 750 deg. Cent., the presence of ammonium chloride in the gas was detected. It was undoubtedly that the production of the ammonia was caused directly by the igneous decomposition of the coal. however, unknown. There are just three ways of getting the nitrogen out of the coal: (1) By decomposition by heat; (2) by leading hydrogen through the hot coke, and (3) by conducting steam through hot coke. No other methods are known.

Gas from Solid Fuel

Water gas is led through the hot coal in a suitable retort. The coke residue is then treated with steam before it is allowed to cool off altogether. The temperature of the coke is kept at such a point that it is high enough to decompose the steam that is conducted through and produce water gas, which may be used further for the treatment of new masses of coal. The fuel must always be at a lower temperature than that of the water gas that is acting on it. The mixture of water gas and other gases is then led away to a suitable purification installation. For details see United States Patent No. 1,388,145.

Removing Carbon Oxysulphide from Illuminating Gas

The gas is treated with alkaline solutions of iron oxide. The sulphur compound in the gas is removed by this treatment. Then the iron oxide solution may be reoxidized by blowing air through it. See German Patent No. 348,408.

Pictures showing United States Government exhibit of the right and wrong way to burn natural gas

Public Utilities Securities Market Report

Prices of Representative Gas Bonds

(Quotations furnished by The National City Company)

Company	Issue	Maturity	July 13, 1922 Bid	Asked
American Lt. & Trac. Co.	Five Year 6s	May 1, 1925	106	106¾
Brooklyn Union Gas Co.	First Consol. 5s	May 1, 1945	95½	96
Columbia Gas & Elec. Co.	First 5s	May 1, 1927	95½	96
Consol. Gas, Elec. Lt. & Pr. Co. of Baltimore	First Ref. 7½s	Dec. 1, 1945	108	108¾
Consol. Gas, Elec. Lt. & Pr. Co.	General 4½s	Feb. 14, 1935	88	90
Consol. Gas Co. of New York	Sec. Conv. 7s	Feb. 1, 1925	120½	121¼
New Amsterdam Gas Co.	First Consol. 5s	Jan. 1, 1948	82	84
Denver Gas & Elec. Co.	Gen. (now 1st) 5s	May 1, 1949	92¾	93½
Detroit City Gas Co.	Gold 5s	Jan. 1, 1923	99¾	100¼
Equitable Illum. Gas Lt. Co. of Philadelphia	First 5s	Jan. 1, 1928	100	101
Hudson County Gas Co.	First 5s	Nov. 1, 1949	89	—
Laclede Gas Light Co.	Ref. & Ext. 5s	Apr. 1, 1934	91	91½
Louisville Gas & Elec. Co.	First & Ref. 7s	June 1, 1923	100	101
Michigan Light Co.	First & Ref. 5s	Mar. 1, 1946	87	89
Milwaukee Gas Light Co.	First 4s	May 1, 1927	92	92½
Pacific Gas & Elec. Co.	Gen. & Ref. 5s	Jan. 1, 1942	90½	91¼
Pacific Gas & Elec. Co.	First & Ref. 7s	Dec. 1, 1940	105½	107
Cal. Gas & Elec. Corp.	Unif. & Ref. 5s	Nov. 1, 1937	95½	97
Peoples' Gas Lt. & Coke Co.	Refunding 5s	Sept. 1, 1947	90¼	91
Chicago Gas Lt. & Coke Co.	First 5s	July 1, 1937	95	96
Portland Gas & Coke Co.	First & Ref. 5s	Jan. 1, 1940	88	90
Seattle Lighting Co.	Refunding 5s	Oct. 1, 1949	82	84
Southern California Gas Co.	First 6s	Nov. 1, 1960	93¾	95
Utica Gas & Electric Co.	Ref. & Ext. 5s	July 1, 1957	89⅜	—
Washington Gas Light Co.	General 5s	Nov. 1, 1960	94	94¼
Western States Gas & Elec. Co. of California	First & Ref. 5s	June 1, 1941	89½	—

Greater Increase in City Taxes Than in Gas Rate

New York, N. Y.—That the cost of gas to the consumer has not kept pace with increased cost of municipal government in Greater New York City is indicated by statistics compiled by the Consolidated Gas Company.

Impounded collections of various companies in excess of the 80-cent rate, which were released by decree of the United States Supreme Court, amounted to $33,279,857.

Net deficiencies in earnings, in excess of the impounded moneys released, were as follows: Consolidated Gas Company, $27,692,960; New Amsterdam Gas Company (including E. R. Gas Company), $7,802,687; Central Union Gas Company, $4,776,592; Northern Union Gas Company, $2,900,744; Standard Gas Light Company, $6,575,569; N. Y. Mutual Gas Light Company, $5,142,975, and Brooklyn Union Gas Company, $16,791,865.

The present price of gas, which is substantially lower than that charged a year ago by such companies as had obtained decrees in the District Court, is from 50 to 60 per cent higher than pre-war price of 80 cents per thousand, but is somewhat less than the actual present cost, including a fair return on the investment. Percentage of increase in the price of gas compares favorably with the percentage of increase in the cost of administering the municipal government, indicated by the increase in the amount of real estate taxes levied by the city of New York, which since 1914 amounts to an increase of 95.58 per cent, or $138,037,805.

Had the increase in the cost of gas kept pace with the increase in the cost of city government the price of gas, instead of being $1.25, would be $1.56 per thousand cubic feet.

Receipts Show Increase

The report of the General Gas & Electric Company and its subsidiaries for May, 1922, shows a gross of $941,077, an increase of $29,378 over May, 1921, and a net after taxes of $255,769, an increase of $5,723. For the twelve months ended May 31, 1922, the gross was $11,677,786, net after taxes $3,223,723, and balance after charges, except General Gas & Electric interest charges, $840,822. The parent company's interest charges for the period were $371,504, leaving gross surplus of $469,318.

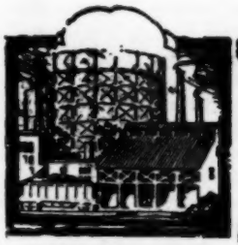
Associated Gas Net Up

The report of the Associated Gas & Electric Company for the year ended May 31, 1922, showed a net income of $79,736, as compared with $66,255 for the previous year, an increase of $13,481. Gross was listed as $1,948,202, as against $1,614,479 for the previous year, or an increase of $333,723.

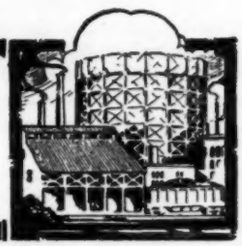
The May report listed gross at $154,965, as against $130,862 for the same month the previous year, an increase of $24,103. The net income showed $16,384, as compared with $12,358 for the same month last year, an increase of $4,163.

Would Increase Rates

Harrisburg, Pa.—The New Wilmington Gas Company, operating in Lawrence and Mercer counties, has filed with the Public Service Commission new tariffs effective July 20, regarding various increases, decreases and omissions in existing rates.



NEWS OF THE GAS INDUSTRY



Properties of New Orleans Railway & Light Company Ordered Sold at Auction

Pursuant of the mechanical process of reorganization of the New Orleans Railway & Light Company, the Federal courts recently ordered sale at auction of the properties of the utilities company in question to satisfy the mortgage judgment of the 4½ per cent and 5 per cent bondholders, unless the amount of the judgment, approximating $27,000,000, is paid within the next ten days. With the assent of virtually all the 4½ per cent bondholders assured for the reorganization plans, the date of the sale will be fixed at the discretion of D. H. B. Chaffe, special master, whose report of June 10 recommending the sale has been approved by the Federal court.

The property has been foreclosed under the mortgage securing the 4½ per cent bonds, and by agreement it will be purchased for transfer to the New Orleans Public Service Corporation, by which name the new company will be known after Oct. 1. Bondholders were given until July 5 to deposit their bonds with the protective committee. Those who failed to deposit their bonds within the limited time found themselves confronted with a loss of their rights, for after that date the deposit of bonds was permitted only under exceptional circumstances and at the discretion of the protective committee. More than 97 per cent of the bondholders deposited their bonds on time and assented to the plan.

While the assent of holders of 5 per cent bonds and 7 per cent notes of the New Orleans Railway & Light Company is not required for the immanent sale of the properties under the mortgage securing the 4½ per cent bonds, an effort is being made to secure the deposit of as many of these securities as possible. The Eastern financial institutions interested in the reorganization of the New Orleans Railway & Light Company have notified all these junior security holders, through the columns of local papers, that deposit of the bonds and notes can be made up to Aug. 1. It is doubtful whether or not all these bonds and notes will be collected within the required time, as many of these securities are held abroad.

In this connection the two following notices appeared simultaneously but separately in the New Orleans papers under the heading of the New Orleans Railway & Light Company:

"Notice to owners of refunding and general lien five per centum gold bonds of New Orleans Railway & Light Company and to bondholders under the bondholders' agreement bearing date Jan. 21, 1919:

"Pursuant to the terms of Article V of the bondholders' agreement dated Jan. 21, 1919, notice is hereby given that the committee, acting under such agreement, has prepared, approved and adopted, and has filed with the depositary, the Pennsylvania Company for Insurance on Lives and Granting Annuities, 517 Chestnut Street, Philadelphia, Pa., a plan and agreement for reorganization of New Orleans Railway & Light Company.

"All holders of certificates of deposit issued by the depositary and its holders under the said bondholders' agreement dated Jan. 21, 1919, are hereby notified that unless they file with the depositary written notice of their dissent from said plan and agreement of reorganization within twenty days after June 26, 1922, the date of the first insertion of this notice, specifying the dates and numbers of the certificates of deposit held by them, they shall be conclusively deemed to have assented to such plan and agreement of reorganization and shall be bound by all the terms and provisions thereof.

"Bondholders who have not deposited their bonds must deposit the same with the committee under the said bondholders' agreement and the said plan and agreement for reorganization on or before Aug. 1, 1922, after which date no deposits will be received except in the discretion of the committee.

"George K. Reilly, Chairman; John S. Newbold, George A. Colston, Arthur V. Morton, Lynn H. Dinkins, Committee."

A reproduction of the second notice follows:

"One Year Seven Per Cent Gold Notes Dated June 1, 1918, *and Maturing June* 1, 1919.

"To holders of certificates of deposit issued by Fidelity Trust Company, depositary, and its agent, Central Union Trust Company of New York, under deposit agreement dated Jan. 30, 1919:

"Notice is hereby given that the noteholders' protective committee appointed by the deposit agreement dated Jan. 30, 1919, for the one year 7 per cent gold notes of the New Orleans Railway & Light Company have prepared, approved and adopted a plan and agreement dated June 12, 1922, for the reorganization of the New Orleans Railway & Light Company, copies of which have been filed with the Fidelity Trust Company of Philadelphia, depositary, and with agent, Central Union Trust Company of New York.

"All holders of certificates of deposit issued by the depositary and its agent under said deposit agreement are hereby notified that unless within twenty days after June 26, 1922, the date of the first insertion of this notice, they shall withdraw from the said deposit agreement specifying the dates and numbers of the certificates held by them, in the manner and upon the conditions therein specified, they will be conclusively and finally deemed to have assented to the said plan and agreement of reorganization, and will be bound by all the terms and provisions thereof.

"Noteholders who have not deposited their notes must deposit the same with the committee under the

said deposit agreement and the said plan and agreement for reorganization on or before the first day of August, 1922, after which date no deposits will be received except in the discretion of the committee."

As the Federal court requires four weeks' advance advertising for the sale, it is highly improbable that the sale can be held before the latter part of August or during the first two weeks of September. Immediately after the sale, distribution of the New Orleans Public Service Company will be made and the reorganization of the New Orleans Railway & Light Company completed.

While enough bonds had been deposited two months ago to assure the success of the reorganization, according to R. S. Hecht, chairman of the 4½ per cent bondholders' committee, it has been the desire of the committee to obtain as large a percentage of the outstanding ones as possible.

The purchaser of the properties of the New Orleans Railway & Light Company at the foreclosure sale must assume all the obligations of the receivership under the terms fixed by the court on July 5. If the court so rules, these obligations must be paid in cash—although it is extremely doubtful if such will be the ruling.

It is interesting to consider what these obligations of receivership amount to. Total judgments against the New Orleans Railway & Light Company arising from the default of interest payments on the 4½ per cent mortgage bonds and the 5 per cent gold notes as of June 10, 1922, are as follows:

Four and One-half Per Cent Bonds

Outstanding bonds	$18,502,000.00
Defaulted interest	796,586.00
Outstanding coupons.	7,132.50
Total default	$19,305,718.50

Five Per Cent Gold Notes

Outstanding notes (series A and B, 7,475,295 francs, or $682,494.16 on the basis of 9.13 cents value per franc	$5,010,000.00
Total with interest	$6,800,613.25
Grand total of judgment	$26,106,331.73

Vapors from Southwestern Gas Area

The Gulf Refining Company, Taylor & Gardner, Spears & Mitchell, Taylor & Spooner and several other operators are said to have acquired approximately 35,000 acres of gas and oil rights in Union Parish, La., and Union County, Ark. The territory surrounds Junction City, and straddles the Louisiana-Arkansas border. These companies and partnerships will operate in Louisiana and Arkansas on the largest scale yet undertaken. Reports indicate that the Arkansas-Louisiana State line in the vicinity of Junction City is to have a very active campaign for oil and gas findings. It is only natural that as a result of these steps to drill new wells, Junction City is enjoying a rather substantial boom.

After having been abandoned several weeks ago because of defective drilling, the Amalgamated Company's Perry No. 1 well, in section 19-20-5, near Monroe, La., again came in recently with a flow of 12,000,000 cu. ft. of gas. In the hands of its initial operators, when the well was first brought in it never produced more than 5,000,000 cu. ft. daily. Because of the fact that it had been giving considerable trouble, it was recently declared a non-producer and, for that reason, abandoned. The contract to put the well in tip-top shape again was conceded to the Sid Simmons Drilling Company. This company not only eliminated the troubles of the former drillers but, in bringing in the well, increased its productive capacity.

Mrs. Annie R. Mauser has granted a three-year gas and oil lease, with privileges of building pipe lines and tanks, to the Standard Carbon Company, in section 32-19-5, at Swartz, Ouachita Parish, La. The sum of $40 was paid for the lease of the land, which comprises forty acres or, in other words, $1 per acre for drilling rights. Provisions of the contract call for the drilling of a well within the period of a year from the date of the lease and in case of failure to strike either gas or oil the Standard Carbon Company agrees to pay a forfeit of $1,000. Mrs. Mauser has retained one-sixteenth royalty of all crude products severed from the land.

Location for a new well to be drilled by the Natural Oil & Gas Products Corporation has been completed in section 27-20-5, Ouachita Parish, near Monroe, La., and clearing of the site started immediately after the location had been decided upon. Considerable interest centers about the drilling of this well, which will be located at a point some distance from the recognized Monroe field. Indications of gas or oil will be carefully watched. Drilling will commence as soon as the corporation's pipe line from the works to location is laid.

The Oil Operators Trust Company's No. 2, near El Dorado, Ark., blew in recently from a reported depth of 590 ft., throwing gas and sand seventy-five feet above the derrick. This well is located about three-eighths of a mile southwest of the first well in the north, the giant gasser which caused a crater 400 ft. in diameter. Because of its proximity to this other well, the Oil Operators Trust Company's No. 2 has been in the public eye since drilling commenced. It is understood that the surface casing was set in this well at between 400 and 500 ft.

Disposition by the Standard Oil Company of the two wildcats south of the Bellevue field, La., recently making 1,000,000 and 2,500,000 cu. ft. of gas respectively has not been determined. They are too small to be of much value for fuel to drilling rigs, due to the fact that the State Conservation Department rules that only 25 per cent of their daily capacity can be drawn from them and this would serve only one or two rigs—not enough to warrant the expense of a pipe line. Should these wells be drilled deeper there is a chance that they may develop larger productive capacity, in which event they would then become of value.

The Oil Fields Gas Company, which is furnishing all the gas used as fuel in Haynesville, La., drilling operations, and also all the gas used by the town of Haynesville, has taken a step which will tend to improve its facilities and increase its present efficiency. This company, according to its officials at

Haynesville, has laid a line to the Albert Glassell et al No. 1 Wise, in 30-23-9, Webster Parish, which was completed recently with 30,000,000 cu. ft. of dry gas at 1,150 lb. rock pressure, from 2,723 ft. The Oil Fields Gas Company, it is reported, has bought the entire production of the well in question.

A well with dual properties was recently brought in by the Detroit Summerville Company, near El Dorado, Ark. The well—Moody No. 2, in the northeast corner of the southwest of 17-17-15—came in making dry gas but began to spray oil with its 45,000,000 cu. ft. of gas and is said to be increasing in volume. Due to the fact that it was necessary to change master gates on account of a small leak, work on Moody No. 1 will not be started up until after the change is made.

George & Jones' No. 1 Murphy, in 8-16-15, continues to make an immense flow of gas, variously estimated at from 55,000,000 to 60,000,000 cu. ft. Crews will begin another well in the same township at the earliest possible date.

The area of the Monroe gas field has been found by the Bureau of Mines engineers to be 212 square miles. It has, since the above-mentioned survey, been developed to more than 250 square miles by recent wells. In its full development, it will be found to cover at least 400 square miles. The gas reservoir on a 212 square mile basis contained thirty cubic miles. On a basis of full development, or 400 square miles, it would contain practically twice that much.

Fulton County Gas & Electric Company Wins Complete Victory

The Fulton County Gas & Electric Company has won a complete victory over the Rockwood Manufacturing Company, Inc., in its efforts to restrain the latter company from the improper and unreasonable use of the waters of the Caroga Creek.

After a hard-fought legal battle in Schenectady Supreme Court, heard by Justice Edward C. Whitmyre without a jury, an injunction has been secured bringing the desired relief, while the Fulton County Gas & Electric Company is also awarded nominal damages of six cents, together with costs of $265.16.

The plaintiff sought to secure an injunction and at the same time to recover damages of $75,000 by reason of the alleged unreasonable use of the waters of this creek. The Rockwood company put in a counter-claim seeking to restrain the plaintiff from using the waters of this creek in the manner complained of and asking damages of approximately $260,000.

Fred Linus Carroll, of Johnstown, was counsel for the plaintiff, and John T. Norton, of Troy, and Benjamin McClung, of Albany, the defendant.

The summons and complaint in the action was served Oct. 23, 1920, and issues were joined by service of the defendant's amended answer on Dec. 2, 1920.

At the time of service of the summons and complaint, an injunction was issued restraining the defendant from such unreasonable use of the waters of the Caroga Creek until the return of a show-cause order which accompanied the injunction order. On the return of the order to show cause the injunction previously granted was continued with certain modifications as to its form, pending the outcome and determination of the case. An appeal was taken by the defendant and the order unanimously affirmed by the Appellate Division.

The action first came up before Justice Whitmyre at a term of Supreme Court in this city on April 18, 1921, and the trial thereof was adjourned with the consent of the respective parties to May 2, 1921, in Schenectady.

The trial required two weeks' time and the testimony when transcribed filled 1,800 typewritten pages. Much of this was expert testimony. Seventy exhibits were offered in evidence by the plaintiff and sixty by the defendants.

Judge Whitmyre filed his decision in the case on June 17, 1922, which consisted of sixty findings of fact and sixteen conclusions of law. The judgment and decree was subsequently issued in exactly the same form as requested by the plaintiff, and the same was filed in the office of County Clerk E. T. Cross.

The Rockwood company dam, which has been the bone of contention, is located between the Pecks Pond dam, used as a storage reservoir by the Fulton County company, and the lower or Forbay dam, from which a pipe line leads to the Caroga Power House.

Under the provisions of the judgment and decree, it is "ordered, adjudged and decreed that the defendant herein may be enjoined and restrained either from opening or leaving open to any extent whatever, the gates of its so-called Rockwood dam, or, at its election, from closing to any extent whatever the gates of the said dam if it shall elect at the time of the service of this order, judgment and decree to keep its said gates of said dam open instead of closed.

"It is hereby further ordered, adjudged and decreed that in case said defendant elects to open and keep open said gates of said dam that it shall discharge in reasonable quantities the waters already impounded thereby so as not to cause the wastage thereof at the so-called Forebay dam of the plaintiff; and that it shall at all times keep the gates of said dam free from logs, brush and other drift and obstruction so that there shall be free passage of water therethrough.

"And that in case said defendant elects to close said gates of its said dam, it shall discharge therefrom, during the filling of its said dam, water in sufficient quantities to enable the plaintiff to continue the operation of its plant.

"It is hereby further ordered, adjudged and decreed that the defendant shall make its election immediately upon the service of this order, judgment and decree as to whether it will keep the gates of its said dam open or closed and that having made such election it shall immediately proceed to the exercise thereof by either opening or closing said gates as herein directed.

"It is hereby ordered, adjudged and decreed that the defendant, having made the election hereinabove described may reverse said election by opening said gates if closed or closing gates if open, provided that it served personally on one of the officers or directors or the manager of the plaintiff not less than ten days before so doing written notice of its intention so to reverse said election; provided also, that when so opening or closing said gates the openings thereof be so regulated that there shall not be passed thereby less than one hundred cubic feet per second of water

or, including such water as may go over the spillway of the defendant's dam, more than one hundred and fifty cubic feet per second of water; and provided also that such change in election and consequent alteration shall not be exercised by the defendant more frequently than once in six months.

"It is hereby further ordered, adjudged and decreed that, in case the defendant shall build a plant directly connected with said dam and to be operated by the water impounded therein, the defendant may, upon personal service on an officer or director or the manager of the plaintiff of written notice of the time and place of making such application at least ten days prior to the making thereof, apply to this court at a special term thereof, for the modification of this order, judgment and decree as set forth and specified in such notice.

"It is hereby further ordered, adjudged and decreed that the plaintiff, Fulton County Gas & Electric Company, recover of the defendant, Rockwood Manufacturing Company, Inc., the sum of 6 cents as and for its damages herein, together with $265.16 for its costs and disbursements herein, as taxed and adjudged, amounting in all to the sum of $265.22, and that said plaintiff have execution thereof."

May Build Large Plant

Elmira, N. Y.—The E. W., L. & R. R. Company in a letter to the Common Council signed by F. H. Hill, general manager, has offered to build an artificial gas plant to furnish gas to fill in the deficiencies in the natural gas supply and give an even supply the year round.

The letter from Mr. Hill is in answer to a communication from Mayor Wood, who wanted to know what could be done about giving the people of Elmira an adequate gas supply the year round.

A resolution was passed calling for a special meeting of the Common Council, at which time Mr. Hill and President Reeser of the Potter Gas Company, of Pittsburgh, and others interested in the gas situation will be asked to be present. The matter will be thoroughly investigated and a decision as to an increase in gas to 95 cents per thousand cubic feet, in order to get a municipal plant, will be left to Elmira consumers to vote.

The following communications between Mayor Wood and Mr. Hill explain the entire gas situation as it now stands in regard to an artificial plant:

CHEMUNG COUNTY GAS CO.,
F. H. HILL, GENERAL MANAGER,
ELMIRA, N. Y.:

Dear Mr. Hill—I am writing you for information on the gas situation. The letter published in the *Star-Gazette* Thursday, the 22d, sent to M. H. Murphy by Mr. Reeser, president of the Potter Gas Company, calling attention to decreased pressure of their gas wells, and although statement shows more wells being drilled the situation does not look good. My experience last winter during the unemployment period, with hundreds of people coming in the office, convinced me that what we must have is more gas, not less. I find many homes depend on gas for both heating and cooking, and how they get along I do not know when there is not enough gas to light many times during the cold weather, and this condition is usually coincident with undernourished persons and results in many cases of pneumonia and colds. Yet, as long as there is hope of getting sufficient gas people will continue to do without other heating appliances.

I know of some cities where they supplement the natural with artificial gas during low-pressure periods. This, I assume, means higher price per thousand feet, and it seems as though the last increase, though small, had reached the limit of possibilities. There is, as you know, no one thing that is more important to nearly every householder than the gas supply, and if any possible pressure can be applied to Mr. Reeser or the Potter Gas Company to furnish more gas, or if there is any way of combining artificial gas or of storing a supply, please let me know as soon as possible.

I will do anything reasonable to get this matter settled before winter. I am going to bring it to the attention of the council at the next meeting and ask their help to solve this perplexing gas question before we go through another winter.

Yours very truly,
J. N. WOOD, *Mayor.*

Mr. Hill in his reply to the Mayor's letter declared:

THE HON. J. N. WOOD,
MAYOR CITY OF ELMIRA,
ELMIRA, N. Y.:

Dear Sir—Acknowledging your letter of June 23 making inquiry as to what action we propose to take to meet the shortage in the supply of natural gas, as set forth in the letter of E. B. Reeser, president of the Potter Gas Company, of June 21.

This company is prepared, with the assistance of the city administration and the citizens of Elmira, to meet this condition by building an artificial gas plant to furnish gas to fill in the deficiencies in the natural gas supply.

No one knows how much natural gas we will get, and therefore how much artificial gas must be made to fill the demand. Our studies indicate that we should have a plant of a daily capacity of 1,500,000 cu. ft. to meet the extreme low conditions or failure of the natural gas supply.

We are willing to go ahead and build an adequate gas manufacturing plant if we can raise the money to build it. In order to raise this money we would sell our first preferred 7 per cent stock. In order to sell this stock we must show purchasers that our rates will safely carry the dividends. We will first of all ask the citizens of Elmira to show their interest and appreciation of the situation by the purchase of this stock.

The net rate necessary to give this service is 95 cents per thousand feet, with a minimum of $1 per thousand cubic feet.

If the Mayor and City Council of the City of Elmira will join us in a petition to the Public Service Commission requesting that such a rate be established, we will upon the granting of this petition proceed with the construction of a plant such that we will be able to assure our customers an ample and continuous supply of gas at all seasons of the year.

We trust that this proposition will meet with the approval of the council and yourself, and that prompt action will be taken, that Elmira may enjoy the advantages of the improved service by January, 1923.

Yours very truly,
F. V. HILL, *Vice-Pres.*

Arabi Asks Gas Service

New Orleans, La.—Residents of Arabi, St. Bernard Parish, recently were planning to address a petition to the New Orleans Railway & Light Company for a gas system when gas mains are laid to the Ford plant at Friscoville. Gas service at Arabi long has been desired by the residents.

Seek Cost Basis for New Gas Plant

Ashtabula, Ohio.—As the first step looking toward the erection of a holder and an emergency manufactured gas plant, to be financed by the Ashtabula Gas Company, city council, at a meeting of council as a committee of the whole following the regular meeting, authorized City Manager Cotton to obtain a certified public accountant to check over the books of the Ashtabula Gas Company in an effort to arrive at a satisfactory figure which shall be taken as the real physical value of the Ashtabula plant.

This action was taken following the presentation of a third proposition for the erection of the holder and the emergency manufactured gas plant submitted by F. W. Stone, manager of the Ashtabula Gas Company.

In the opinion of the majority of council members it would not be advisable for the city to enter into the project of constructing the holder and emergency gas plant.

The proposal for the erection of a holder with a capacity of 500,000 cu. ft. and a blue water gas generator with a capacity of 500,000 cu. ft. every twenty-four hours, as submitted by Mr. Stone would entail an estimated cost of $150,000.

The proposition provides for a price adjustment at certain stated intervals, the rate scale to be set by a commission. In this manner the rate would fluctuate according to the actual cost of providing gas.

"Because of the uncertainty of future conditions in the gas business it would be necessary to amortize the investment of $150,000 over a period of five years," Mr. Stone's communication states. "A contract fixing the price of gas for the next five years would not prove satisfactory to either the citizens of Ashtabula or to the gas company. Within that time decided changes might occur and if by reason of fortunate circumstance the gas company should make more than a fair profit by reason of that contract the public would feel aggrieved. On the other hand, circumstances might arise which would so affect the gas business that the company would suffer serious loss by being obliged to comply with the contract," the letter reads.

If the price were to be fixed by a commission it would be necessary to first decide on the value of the gas company property on which a certain rate of return is to be based, it was pointed out. It was for this reason that council authorized the city manager to engage a certified public accountant to check up on the books of the gas company.

In order to amortize the amount of the invested capital necessary for the erection of a holder and emergency gas plant, over a period of five years a consumer charge of $1.11 per month would be necessary, the communication points out.

"The natural gas which could be stored in the holder, mixed with blue water gas which would be used to augment the supply of natural gas in times of shortage, could probably be sold at the same rate as is now charged for gas in Ashtabula," Mr. Stone stated.

"Both the holder and the blue water gas plant would be so constructed as to be units of a permanent manufactured gas plant which will ultimately be the only solution to the gas problem," Mr. Stone stated.

"Engineers state it is far cheaper to run a coal gas plant which probably will have to come later, at capacity. The blue water gas plant which is now proposed in connection with the holder, could then be used to augment that supply at peak-load times."

The first proposal which was presented to city council two weeks ago provided for the construction of the holder and emergency manufactured gas plant by the city. The other proposal provided for the construction of the plant by the gas company under the supervision and direction of the city, while third proposal, which was presented Monday night, would provide for the erection of the plant by the gas company independently of the city. This proposal was made following a request for such a plan by council a week ago.

Rate Hearing Postponed

Quebec, Ont.—The hearing of a petition on behalf of the city of Quebec to force the Q. R. L. H. & P. Company to reduce its gas rate from $1.75 to $1.45 per thousand cubic feet, before the Public Service Commission, was adjourned until the 26th of September at the request of the company. No objection was raised by the city.

Progress Noted in Customer Ownership Campaign

Announcement is made that the customer ownership campaign of the New York State Gas & Electric Corporation, which was inaugurated on June 19, is progressing satisfactorily. This company operates in the south central section of New York State, supplying gas and electric service to about 20,000 consumers in the cities of Ithaca, Cortland, Norwich and Oneonta, as well as in twelve villages and eighteen towns. The company is offering three thousand shares of its cumulative preferred stock of no par value, and paying dividends of $7 per annum, at $100 per share, this issue of preferred stock having been authorized by the New York State Public Service Commission for the payment of a 3,000-kw. turbine and a 500-h.-p. boiler in the power plant at Ithaca; a new water gas set and accessories at Cortland, and the construction of a transmission line between Oneonta, Sidney and Norwich.

Picnic for Gas Companies' Employees

The picnic grounds of Fairmount Park in Kansas City, Mo., were the scene of a gathering of over 2,500 employees of the Kansas City Gas Company and the Wyandotte County Gas Company Thursday afternoon, June 27. This is the third annual picnic to be staged by the employees of the two companies.

The hosts were members of the Good Fellowship Club of both companies. In order that all employees might attend, the managements declared a half holiday.

A program of athletic events was given in the afternoon and prizes awarded the winners. The children were treated by the hosts to rides and visits to the various concessions during the day.

To Purchase Bonds

The United States Mortgage & Trust Company, as trustee under the first and collateral trust mortgage of the Union Gas Company, of Spokane, Wash., has received $17,918 to be applied to the purchase of bonds of this issue. Holders of the bonds are invited to offer the same to the trustee for such purchase at a price not to exceed 110 and accrued interest. Tenders will be received up to noon July 25.

Union Power Co. Well Near Spencer, La., Ablaze

Considerable damage was incurred when the Union Power Company's well No. 3,005, in section 3-20-3, of Union Parish, near Spencer, La., blazed recently and burned steadily for several days despite all efforts to extinguish it. In an effort to place the blame, various rumors were started as to the possible cause of the trouble.

The first of these rumors concerned the sinister activities of a "fire bug" supposed to be operating in the Monroe gas field and were reported by R. L. Sharp, Conservation Department official, upon his return from a visit of inspection of the Union Power Company's well. This report, however, was judged to be quite groundless and suspicion next settled upon two boys who had been seen loitering in the vicinity of the well some time prior to the fire.

The boys, it was said, were probably motivated by curiosity to learn "what would happen" if a burning match were applied to the gas well and acted accordingly. The identity of the two boys who were actually seen about the place of the fire still remains a mystery and it has become more and more doubtful that they were really the cause.

The most likely story centers about an electrical disturbance which swept over the section, just before the fire and it is now generally believed that the gasser was struck by lightning and ignited thereby. Whatever the cause might have been, the well burned steadily about the gate valves and created a blaze that could be seen for many miles around.

The fire, however, was finally extinguished by officials of the Conservation Department and employees of the Union Power Company after a battery of boilers had been brought into play. In spite of the belief that it was caused by lightning, operators in the field were advised to keep a sharp lookout for the "bug" who was supposed to be operating in the field, and patrols were employed for some time afterwards, guarding other wells from fire.

To Vote on New $3,000,000 Gas Plant

Kalamazoo, Mich.—Kalamazoo voters at the general election next November will decide the fate of a proposed bond issue for $3,348,658 for a new municipal gas plant. The vote was authorized by the city commission.

The proposal was submitted to the people following a survey by the gas engineers which showed the cost of erecting a new plant. It was decided to take steps toward erecting a new plant when the gas company last winter refused to lower its rates. While the survey was being made, however, the company did make a slight voluntary reduction.

Water Gas Apparatus for Du Quoin, Ill.

Work is under way on two seven-foot water gas sets to be erected at Du Quoin, Ill. With these machines will be furnished the usual operating floor, a steam operated coke hoist, several large coke buggies and two high-speed turboblowers.

Contract for the new gas apparatus has been placed with the Western Gas Construction Company.

Construction Notes

The Torrington (Conn.) Electric Company is making improvements to its gas plant in order to provide for increased manufacturing capacity and has placed its orders with the U. G. I. Contracting Company, of Philadelphia, Pa.

The Sioux City (Ia.) Gas & Electric Company is making extensive improvements to its gas plant. They lately placed orders with the U. G. I. Contracting Company, of Philadelphia, Pa., for a nine-foot cone-top carbureted water gas apparatus and more recently have authorized the same company to install two eight foot six inch by twenty-two foot condensers, motor driven pumps, motor driven fan booster and to enlarge the purifiers.

Wife of East St. Louis Gas Manager Dies

Plans made by W. A. Bertke, recently appointed general manager of the gas properties of the Southern Illinois Light & Power Company, to begin the furnishing of his new home, 621 North Seventy-second Street, East St. Louis, Mo., were frustrated when news came of the sudden death of his wife, Mrs. Minnie Bertke, in Harland, Iowa.

Manager Bertke, who is also East St. Louis manager for his company, came from Great Falls, Mont., early in June. Mrs. Bertke and their five-year-old son remained to visit in Harland until the East St. Louis home was available.

Manager Bertke departed for Harland. The gas properties of which he is in charge are in a hundred southern Illinois towns.

Gas Service Is Extended in Southern Illinois Towns

Du Quoin, Ill.—One million dollars will be spent this summer by the Southern Illinois Gas Company in extending its service in this part of the State. Approximately $350,000 will be spent here in building a big gas manufacturing plant, large holders and the extension of gas mains throughout the city.

A pipe line will also be laid from the Ava natural gas field to Du-Quoin via Murphysboro and the natural and manufactured gas will be mixed. A pipe line will also be laid extending gas service to Christopher, Benton and West Frankfort. Another line is also in service between Murphysboro and Marion, and this will be extended to West Frankfort, making a complete circuit connecting these towns.

Use of Forty Billion Feet of Natural Gas for Carbon Black

Washington, D. C.—Forty billion cubic feet of natural gas are used annually in the United States in the manufacture of carbon black, a material which is employed in the making of an astonishing number of articles of every-day use, states the Federal Bureau of Mines, which has completed a study of the subject. Carbon black is used extensively in the rubber industry, something like 20,000,000 lb. going annually into the manufacture of automobile tires. From ten to twelve million pounds of carbon black are used annually in the manufacture of printer's ink, and from four to five million pounds in the making of stove polish. The product enters also into the composition of black and gray paint, phonograph records, carbon

paper, crayons, typewriter ribbons, glazed paper, tarpaulins, black leather, artificial stone and insulating materials. In normal times, the United States exports probably 10,000,000 lb. of carbon black in a year.

Confusion exists in the use of the terms lampblack and carbon black. Carbon black is the fluffy, velvety-black pigment produced by burning natural gas with a smoky flame against a metal surface. In its physical characteristics it is entirely different from lampblack, which is made by burning oil or other carbonaceous material with insufficient air and collecting the smoke in settling chambers. The process of manufacture most widely used at present is the so-called channel system, in which the black is deposited on the smooth undersurface of steel channels by lava-tip burners. The mechanism is enclosed in sheet-iron buildings in order that the amount of air may be regulated.

The first factory in which carbon black was successfully made on a commercial scale from natural gas was erected at New Cumberland, W. Va., in 1872. Until the utilization of gas from the prolific gas fields at Monroe and Shreveport, La., 75 per cent of the world's total supply of carbon black was produced in West Virginia. Increases in the price of natural gas in that State, however, caused some manufacturers to move their plants to more isolated districts, where the gas, because of the lack of other markets, is cheap. Thus the Monroe gas field in Louisiana has become an important center of carbon-black plants. Factories are located also in Wyoming, Oklahoma, Montana, Kentucky and other States.

The quantity of carbon black used by the rubber industry since 1917 has been abnormally high, on account of the large production of solid rubber tires for auto trucks during the war. Before the war, it is said, about one-third of the total production of carbon black was consumed by Austria and Germany. England, France, China and Japan import large amounts from American producers.

It is generally conceded that the most important use that can be made of natural gas is for domestic purposes. Whether gas is of greater economic value for the manufacture of carbon black than for other industrial purposes is a question that will depend on the conditions existing in each locality where a large supply of natural gas is available.

The policy of the Bureau of Mines is that carbon black be made when gas is produced in isolated sections with no present or reasonably prospective market for gas being produced, when gasoline has been extracted, and when practical and modern and improved methods are used. At present there is considerable agitation for and against laws restricting the use of natural gas for the manufacture of carbon black. The matter has been the subject of considerable agitation and legislative consideration in the State of Wyoming. The carbon-black industry has been established in Pennsylvania for over forty years, and in West Virginia for more than twenty years. The latter State still produces more than 50 per cent of the entire supply. Neither of these States has passed any laws restricting the use of natural gas for this purpose.

During the past few years a number of carbon plants have been moved from West Virginia to Louisiana. The State authorities of Louisiana became alarmed at the situation and enacted a law regulating the use of natural gas in industries. The Louisiana act does not prohibit the use of natural gas in making carbon black, but makes it unlawful to permit the waste of natural gas, or to use natural gas for any purpose that will threaten with premature exhaustion the common supply from which natural gas is drawn.

The carbon-black manufacturers claim that they use the best manufacturing processes that have been developed and that they produce a commodity of acknowledged utility. They have also provided a market for gas in isolated regions and in so doing have many times prevented conditions that would otherwise have resulted in waste. In certain isolated districts they have furnished small communities with natural gas whose consumption they assert was not sufficient to warrant the building of a pipe-line system.

Carbon-black plants operate until the price of gas rises on account of the supply being made available for domestic consumption by the construction or extension of pipe lines. Then the factories are dismantled and removed to more remote districts that have no other means for disposing of the gas. Thus the industry is necessarily migratory.

Consumers of natural gas live in the gas-producing districts or at a reasonable distance therefrom, whereas users of carbon black are widely distributed. Consequently there is a conflict in interests between those who are in the radius of gas service from the field and those living a considerable distance from the field and benefiting by the use of carbon black.

The Bureau of Mines considers that the utilization in the manufacture of carbon black of low-pressure gas, of gas escaping into the air from natural-gas gasoline plants, gas in distinctly isolated districts, and gas in fields that have been abandoned by other gas companies on account of low pressure, is in reality often a conservation measure. It is preferable to the practice of letting the gas go to waste in the air or to plugging improperly the wells so that the gas sands can be damaged from flooding by water.

More efficient processes should be devised for the manufacture of carbon black. Thermal decomposition offers an interesting field for research as a possible means of increasing the relative efficiency of the industry. In the future it is probable that at some plants the waste heat will be utilized profitably.

Sufficient incentive to enterprise must be provided; to keep the gas in the ground for an indefinite period ties up money and resources. If the gas can be utilized and made to yield good to the State and profit to the individual, the public benefits accordingly, whereas if the gas remains in the ground where it cannot be used and gives no returns on the investment, the loss to the State and to the individual may be gauged by the interest lost during the period of no returns. The question always arises whether it will in the end pay to hold the gas in the ground awaiting an unknown future period of use that will give greater returns than the present methods of utilization. Local conditions are the determining factor.

Probably the most beneficial use that can be made of gas is for domestic consumption and the Bureau of Mines does not recommend that gas be used for the manufacture of carbon black where an adequate market for the gas for domestic purposes is available.

The results of a study of the manufacture, properties and uses of car-

bon black, made by Roy O. Neal, consulting engineer, and G. St. J. Perrott, physical organic chemist, are given in Bulletin 192, just issued by the Bureau of Mines.

Gasoline Stocks Decline

Washington, D. C.—That the hum and purr of the automobile engine is more audible than ever, and that all America has taken to wheels, is indicated by the announcement by the Bureau of Mines that gasoline stocks in the United States, which have been steadily mounting to new high-record marks, are now on the decline. On June 1, stocks on hand at the refineries amounted to 856,607,102 gal., which is 35,661,000 gal. below the record figure of 892,267,766 gal. attained at the beginning of May. The fact that the billion-gallon mark, forecasted in some quarters, was not reached seems due to the tremendous increase in domestic consumption of gasoline, which amounted to 499,242,343 gal. in May. This figure represents an increase in domestic consumption of gasoline of 113,000,000 gal. over the month of April and 145,000,000 gal. over the month of May, 1921. Gasoline consumption figures for May constitute a record for that month, and are within four million gallons of the record-setting figure attained in Aug., 1921, although occurring three months before the customary month of largest consumption.

Production of gasoline in May amounted to 513,658,966 gal., an increase of 41,000,000 gal. over the month of April. The sharp increase in gasoline consumption, however, was sufficient to offset the increased production and to inaugurate the seasonal decline in stocks a month earlier than it usually occurs.

Reports to the Bureau of Mines show that 315 refineries operated during May, an increase of twelve as compared with the previous month. Plants reporting during May were running an average of 85 per cent of their daily indicated capacity.

Exports of gasoline for May amounted to 55,823,839 gal.; imports were 7,104,879 gal., and shipments to insular possessions were 1,358,327 gal.

Production of fuel oil set a new record in May, amounting to 936,742,331 gal. The previous monthly production record of this product was 859,000,000 gal., attained in Dec., 1921. Stocks of gas and fuel oil on hand June 1 were 1,321,437,972 gal., an increase of 38,000,000 gal. over the previous month.

Of interest to automobile users is the announcement that stocks of lubricating oils showed a decrease of 10,837,000 gal. from the figures for the previous month. The production of lubricants in May amounted to 79,848,372 gal., an increase of approximately 7,000,000 gal. over April, but increased consumption of these products effected a reduction in stocks to a figure of 226,293,334 gal. as compared with 237,229,814 gal. on hand May 1. It is estimated that approximately 60 per cent of the lubricating oils produced are consumed by automobile users.

Stocks of kerosene on hand June 1 amounted to 318,890,131 gal. Production and stocks of kerosene show a decrease for the month of May, stocks having reached the lowest point since Sept., 1919. Export shipments of kerosene in May amounted to 63,000,000 gal., which is 17,000,000 gal. less than for April.

Compulsory Bond Buying

A law has been passed in Czecho-Slovakia, where the telephone service is operated by the Government, compelling all telephone subscribers to buy a minimum of 6,000 kronen in Government bonds, the penalty for refusal being the disconnection of the telephone instruments.

Gas-Glass Factory

Our purpose in recording the present item is not to give added prominence to the advertisement, but to show an excellent method of using up the natural gas which forces itself upon oil seekers.

The Refugio Glass Works, of San Antonio, Texas, advertises that it has unlimited natural gas for fuel and mountains of pure silica sand and that it is their intention to locate a glass factory on international railroad near deep-water port.

We judge that the installation of the factory depends upon whether or not they sell sufficient stock, and if anyone is further interested, write the National Bank of Commerce, San Antonio, Texas, ere you let loose of your coin, but here is a tip for others who have the sand and the gas and know not what to do with it. And we might add, why not take the pigment for carbon black while you make glass?

Instal Additional Street Lamps

The following places installed additional Welsbach gas street lamps during the month of June:

Kenmore, N. Y.; South Orange, N. J.; Long Island, Me.; Little Diamond Island, Me.; Cliff Island, Me.; Carrick, Pa.; St. Louis, Mo.; Yonkers, N. Y.; Hamden, Conn.; Woodmont, Conn.; Wellsville, Ohio; Chicago, Ill.; Wilmette, Ill.; Springfield, Ohio; Baltimore, Md.; Elizabeth, N. J.

Elgawa Association Elects Officers

The Elgawa Association, Inc., of Millville, N. J., which is composed of employees of the Cumberland County Gas Company, Millville Electric Light Company, and Millville Water Company, held their sixth annual election of officers last Monday evening.

The officers elected for the ensuing year were: President, S. J. Franklin; vice-president, William C. Buell; recording secretary, William H. Stewart; financial secretary, Walter Owen; treasurer, Harvey Whitaker; directors, Ralph H. Lee, Charles M. Nixon, Louis H. Burge, and William P. Adams.

The membership of the organization now numbers about 150.

Much interest is centered around the Elgawa baseball team, which is the representative team of the city. The team has won sixteen of the nineteen games played this season.

The good, clean sport that is offered to the public has done much to create a more friendly feeling toward the utilities of Millville.

Peoples Gas Band Plays at Hospital

Chicago, Ill.—Thursday evening, July 13, the Peoples Gas Club Band gave a concert at the Cook County Hospital, Harrison and Wood Streets. This is one of a great number of musical performances that the band is appearing in, their schedule taking in most of the hospitals and institutions in and about Chicago. Wherever they play their large audiences insist on a return engagement and in most cases George Laurence obliges. This is most gratifying to every club member and they can be assured of high-class music at their big picnic, July 22, when the band will stop touring long enough to play for them.